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THESIS for the DEGREE of M.D. of EDINBURGH UNIVERSITY

An ETIOLOGICAL & PATHOLOGICAL STUDY of TUBERCULOSIS of the BONES and the JOINTS

by

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PREFACE.

P R E F A C E.

The work that is embodied in this Thesis has occupied me for the past two years; I owe the inception of the idea to Mr. Stiles. The original idea was a study of the Pathology of Bone and Joint Tuberculosis, but as the investigation proceeded, other paths presented themselves, and combined with the Pathology a research into the Etiology was also undertaken. Therefore it may be called a study of the Etiology and Pathology of Bone and Joint Tuberculosis. The material has been obtained practically entirely from children below the age of twelve years.

Under the heading of Etiology I have investigated two points.

A. The type of Bacillus which causes the disease, whether Human or Bovine, and more especially its relation to the question of milk supply.

B. The paths by which the infection reaches the Bones and the Joints.

These investigations have been almost entirely experimental.

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I have studied the Pathology of Bone and Joint Tubercle, partly from the disease as produced experimentally, and partly from Pathological Material.

The text has been bound in three volumes:-

VOLUME I. is composed of Etiology, Part I., dealing with the differentiation of the Organisms.

VOLUME II. includes Part II. of the Etiology, the Paths by which the Organisms reach the Bones and the Joints.

VOLUME III. deals with the Pathology, it also contains the complete Bibliography.

Accompanying the text there are four albums, containing illustrations of the various pathological features, and also a collection of Microscopical Preparations.*

The Illustration and the accompanying slides have been referred to in the text as frequently as possible. The letter 'S' after the illustration number denotes the word 'Slide'.

The expenses of this work have been defrayed, partly by a McCunn Research Scholarship in Pathology, and partly by a grant from the Carnegie Trustees.

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* The slides have been left in the hands of Mr Richard Muir of the Pathological Department of the University.

I have to express my indebtedness to Mr. Stiles and Dr. James Ritchie for their encouragement and assistance. The use of Pathological Material I owe almost entirely to the kindness of Mr. Stiles.

The Illustrations have been the work of Mr. Richard Muir and Mr. Robert Lindsay, and I am indebted to them for the trouble which they have taken.

E T I O L O G Y.

PART I.

E T I O L O G Y

PART I.

A STUDY of the TYPE of BACILLUS (Human & Bovine) which occurs in TUBERCULOSIS of BONES & JOINTS.

At the present day there is considerable agitation regarding the part which Bovine Tubercle Bacilli play in Human Tuberculosis, and as I found myself in possession of a very considerable amount of what one may call specialised material, I felt bound to carry out some investigations upon the subject. In the last 70 cases of bone and joint tubercle which have come under my observation, I have separated the organismal cause, and furnished proof of whether it was Human or Bovine in type. It is specialised material, because it has been entirely (with 3 exceptions) derived from children 12 years of age and under, and from children also living and resident within a definite localized area. I mention these facts, because later I shall have to make some remarks regarding the relation of the milk supply, and the habitat of the cases being local, one can, therefore, speak more pointedly upon this subject.

I shall classify my remarks under different headings.

A./

A. Introductory remarks regarding Human and Bovine Tuberculosis.

B. Methods of differentiating between Human and Bovine Tuberculosis, and the scheme which I myself adopted.

C. The Results of my investigations upon 70 cases of bone and joint tubercle occurring in children 12 years of age and under.

D. Explanations of these results, more especially in their bearing upon the question of milk supply.

A. INTRODUCTORY REMARKS REGARDING HUMAN AND BOVINE TUBERCULOSIS.

When Koch (37.) announced his discovery of the Tubercle Bacillus in 1882, he stated that Bovine Tuberculosis was identical with Human Tuberculosis, and that the disease was transmitted from animals to man and vice versa. Some years later, Maffuci (65.) isolated a form of Tubercle Bacillus from birds, which he termed the Avian Bacillus, and he stated that morphologically and pathologically it was distinct from either the Human or the Bovine Bacillus. This introduced the whole question of whether trust-

worthy/

trustworthy tests could be employed which would differentiate between Human, Bovine and Avian Tuberculosis.

Trudeau (∧) was the first to refer to differences in the growth of tubercle obtained from different sources, and Crookshank (15) in 1891 published some results of a comparative study of tubercle Bacilli isolated from man and various kinds of animals and birds. His conclusion was that morphological differences exist in Tubercle Bacilli obtained from different sources.

In 1896, Theobald Smith (91.) published a paper dealing with certain distinctions which he had noticed to exist between Tubercle Bacilli recovered from a bull and from a bear. The latter animal was supposed to have been infected from its tuberculous master. Between the two varieties there were certain well marked morphological and cultural distinctions.

Two years later Smith (98.) further extended his discoveries and pointed out a number of differences between Bacilli recovered from the Bovine species and those found in the sputum of Human consumptives.

Vagedes/

Vagedes (100), Frotheringham (1) and Dunwiddie (1) published papers upon this same subject, and in 1901 Koch made his startling announcement. Speaking at the British Congress on Tuberculosis, he said:-

> "I feel justified in maintaining that "Human tuberculosis differs from Bovine, "and cannot be transmitted to cattle. . . . "I should estimate the extent of infection "by the milk and flesh of tuberculous cat- "tle as hardly greater than that of here- "ditary transmission, and I therefore do "not deem it advisable to take any steps "against it."

The experiments upon which Koch based his remarks were from the point of view of the infection of the Bovine species by Human Bacilli. Of course circumstances did not permit him to deal with the other side of the question, the infection of the Human species by Bovine Bacilli. In his experiments he inoculated cattle by different routes with Human Bacilli, in every case only small retrogressive lesions resulted. From these results he concluded that he was justified in maintaining that Human Tuberculosis differed from Bovine, and that the disease of the former could not be transmitted to the latter.

So/

So far his position was justified, but unfortunately he made the mistake of stating an insufficient corollary, when he maintained that Bovine Tubercle was unlikely to be transmitted to man. Koch approached this latter part of his investigation upon the assumption that Bovine tubercle derived from milk could only be co-existent with tuberculosis of the intestines, and he quoted the results of many thousands of post-mortem examinations, in only two of which was there ulceration of the gut.

Almost immediately after Koch's announcement, McFadyan ( ) delivered a paper on tubercle Bacilli in cows' milk as a possible source of tuberculous disease in man, and in the course of its delivery, he severely criticised Koch's paper. He believed that the disease was certainly inter-communicable, and his belief was supported later in articles by Nocard ( ), Bang ( ), Sims Woodhead ( ) and Ravenal ( ).

Koch's opinion gave rise to an enormous amount of discussion, and it was the main force in leading theBritish Government to institute a Commission with power to elucidate this all-important question.

The/

The points which they were asked to decide were:-

(1) Whether the disease in animals and man is one and the same disease.

(2) Whether animals and man can be reciprocally infected with it.

(3) Under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favourable or unfavourable to such transmission.

Reports were published by the Commission in 1904, 1907, 1909 and 1911.

In the Report of 1904 they showed that Tubercle Bacilli found in certain cases of so-called Human Tuberculosis produced in cattle a disease indistinguishable from Bovine Tuberculosis.

Three years later, i.e., in 1907, they dealt with Human and Bovine Tuberculosis, and stated the results they had obtained in an investigation of the characters of the Bacillus of Bovine Tubercle.

The third report dealt with certain conditions of the tuberculous cow which rendered her milk infective.

The/

The final report was practically a resume of the entire investigations; they distinguished three different types of Tubercle Bacilli,—Avian, Bovine and Human. From numerous cases of apparently Human Tuberculosis they succeeded in isolating Bacilli with all the characters of the Bovine Bacillus, and in their second report they say:-

> "There can be no doubt but that, in a "certain number of cases, the tuberculosis "occurring in the human subject, expecially "in children, is the direct result of the "introduction into the human body of the "Bacillus of Bovine Tuberculosis; and there "can also be no doubt that, in the majority "at least of these cases, the Bacillus is "introduced through Cows' Milk. Cows' milk "containing Bovine tubercle Bacilli is clear-"ly a cause of Tuberculosis, and of fatal "Tuberculosis in man."

The subsequent reports of the Commission strengthened this conviction, and to-day the doubt raised by Koch as to the communicability of Bovine Tuberculosis to man has been completely dispelled.

One feels that one ought almost to apologise for relating such well-known details.

B./

B. METHODS OF DIFFERENTIATING BETWEEN HUMAN AND BOVINE TUBERCULOSIS, AND THE SCHEME WHICH I MYSELF ADOPTED.

Of course, it is practically impossible to obtain cultures of Tubercle Bacilli directly from a pathological specimen. A growth may sometimes be obtained from pure tuberculous pus, but the chances of the organism not growing are very great. Before a satisfactory opinion can be given upon the type of organism with which one is dealing, it is necessary to have pure cultures of the organism, and to obtain these, guinea-pigs were first inoculated with the original pathological material. The plan adopted was to place beneath the skin of the flank of the animal a small portion of the diseased tissue, bone or synovial membrane. Tuberculosis gradually developed, affecting primarily the nearest lymphatic glands. Four to six weeks after the original inoculation, the animal was killed and examined, and culture tubes inoculated. Should the animal die, a post-mortem examination must be immediately made, and culture tubes inoculated; if there is any delay, secondary/

secondary infection occurs, and the tubes are useless.

Culture Media. In all my experiments I have used Egg Media; Plain Egg Medium (Dorset) (18.) and Glycerine Egg Medium (Lubenau) (52.). I have also used a third variety of Egg Medium, which I call the Blood Egg Medium.

Plain Egg Medium (Dorset's) consists of beaten up eggs, to which has been added a certain measured quantity of water. The mixture is strained through muslin, to dispense with the air bubbles, and afterwards inspissated at 70°C. for three to four hours.

Glycerine Egg Medium.(Lubenau) is made in a similar manner to plain Egg Medium, Glycerine Bouillon being used instead of water.

Blood Egg Medium.I have made in a parallel fashion to Blood Agar, the surface of Plain Egg tubes being smeared with a small quantity of Blood.(Human). I have found Blood Egg Medium most useful.

From the diseased material of the infected guinea-pig cultures are made. Caseating glands are the most suitable tissues, the spleen can also be used. In making these cultures, I have employed a small platinum spud, such is sufficiently strong to enable one to rub the diseased material thoroughly into the surface of the medium. I have not found

it/

it necessary to adopt Smith's method of cutting the diseased tissue into many small pieces. I simply rub the material thoroughly into the surface of the tube. The inoculated tubes are sealed with paraffin, in order to exclude moulds, and they are incubated in an inclined position. In from 4 to 6 weeks there is usually a sufficiency of growth.

With the cultivation of the organism, the first stage may be said to have been completed; from an individual case one has now got a pure culture of the causative organism, and it remains to form an opinion as to which class the organism belongs.

In order to come to such an opinion, the organism is put through a series of tests.

The tests which may be employed I have tabulated, and I shall make a few remarks regarding each.

A. Original Culture test.
B. Morphological test.
C. Special Culture test.
D. Smith's test.
E. Inoculation test.
F. Knee joint test.
G. Histological test.

ORIGINAL/

ORIGINAL CULTURE TEST.

Smith (91.) was the first to employ cultural differences between the two types as a means of differentiation. He found that upon Blood Serum the Human organism grew freely, while the Bovine type grew sparsely. Ravenal (84.) noticed the same difference in growth upon Glycerine Agar, and he found that a Glycerine Medium almost entirely prevented a growth of the Bovine Bacillus. Dorset (19.) found the same difference when the cultures were made upon Egg Medium.

The Royal Commission (86.) divided all cultures into two classes, a dysgonic or poor growing class, and an eugonic or good growing class. In the first class they placed the Bovine Bacillus, in the second class cultures of Human origin were included. It is well to state that a number of investigators have failed to obtain these sharp differences, the most important dissenters being Rabinowitch (86.), Fibinger (24) and Jensen (34.). Although these found quantitative differences in many of their cultivations, the results were too vague and indefinite.

Park and Krumwiede (77.) came to the same conclusion./

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conclusion. They say:-

"The results of our work have led to
"the conclusion that there is no constant
"qualitative cultural difference between
"the Human and the Bovine types of tubercle
"Bacilli."

My own results have been that out of a total of 70 investigations, only 3 cultural reactions are doubtful; in the remaining 67, I had no difficulty in classifying the organisms into one or other section. I scheduled as Human the types which grew upon Egg Medium in a piled up or foliaceous manner; and as Bovine, those which grew in a slow, diffuse and ground glass appearance. Of course, I do not for a moment mean to insist that one can speak absolutely of the type of Bacillus by a mere cultural examination; the possibilities of error are too great, and there are a number which lie on the border line, neither definitely eugonic or dysgonic, yet by this means one can come to a preliminary opinion, and as a guide it is often extremely useful.

MORPHOLOGICAL TEST.

Kossel, Weber and Heuss (49.) found morphological differences upon Bouillon Cultures between Human/

Human and Bovine Bacilli. The Human type were slender, regular in shape and evenly stained; the Bovine type were thicker and shorter. The Royal Commission found similar differences between the two varieties.

Smith, in his original Communication, found the Bovine Bacillus short and almost coccal-like in appearance, whereas the Human type was long and narrow. Ravenal's findings were similar. Dorset affirmed that he found no difference between the two Bacilli, and his view is in agreement with those of Wolbach and Ernst (105).

My own investigation showed that the morphology of the Bacillus was one of its most inconstant features. In 8 cases the characters were such as to prevent one from putting the Bacillus into one or other class; in the remaining 62 cases, I was able to classify the Bacillus, although often this was a matter of difficulty.

I regarded as Human Bacilli those which were long and slender, with the presence of nodular staining, and I classed as Bovine the short, squat Bacilli. (To demonstrate nodular staining it is of advantage to use Much's method,-Methyl Violet-) (69). The point to be guarded against is/

is the fact that, after prolonged residence upon a medium, or continuous sub-culture, the two types of Bacilli tend to approach a common Morphological mean. Speaking generally, therefore, the morphological characters are relative, and may be noted only in a certain proportion of cases. I use the test purely as a suggestive one.

SPECIAL CULTURE TEST.

Moeller (66.) and Beck[9] have noticed that the presence of Glycerine had a restraining effect upon the growth of fresh Bovine cultures. Some authors have denied this, but Cobbett, working on behalf of the Royal Commission, found that Human cultures grew more vigorously on the addition of Glycerine, while Bovine Bacilli were either restrained in their growth or at least retarded.

The test must be employed with primary sub-cultures, as the growing abilities of the Bovine Bacillus increase upon frequent sub-culturing.

In my investigations I have found this a most valuable test, in only one instance did it yield a doubtful result. I counted as Human all those cases in which the growth was stimulated, and as/

as Bovine all those in which the growth appeared to be retarded. My plan was always to inoculate from the primary culture an equal number of plain egg tubes and glycerine egg tubes. The plain tubes were used as controls in gauging the rate of growth upon the glycerine medium. One may say that all cultures growing luxuriantly on glycerine egg from the start are of the Human type, while all cultures growing sparsely, or even not at all, on glycerine egg in the early sub-cultures are of the Bovine type.

SMITH'S TEST.

By inoculating Glycerine Bouillon medium, it is possible to get a pellicular growth of tubercle, extending over the surface. By the rate of growth of the pellicle and its thickness, it is often possible to come to a conclusion regarding the nature of the Bacillus, but the growth upon the medium has another effect, which may be employed as a test measure. If before the inoculation is made, the Bouillon is carefully standardized to a certain degree of acidity, it will be found that, as the tuberculous material grows, there is produced a certain distinctive change in the amount of acidity, in one instance the/

the acidity will progressively increase in degree, in yet another it will steadily diminish, and it is upon this distinction that a test may be based; for it is found that it is the Human Bacillus which produces an increase in acidity, while the Bovine Bacillus gives rise to a diminution of acidity, and even a slight degree of alkalinity.

Theobald Smith (93.) first gave a description of the test, and in a number of cases he found it thoroughly reliable and trustworthy.

Bang (8) tested the reaction upon 12 strains of the Avian Bacillus, using 4 Human and 1 Bovine as controls. He found the reaction quite constant, and, moreover, that the Avian Bacillus had the same reaction curve as the Bovine.

Griffiths (30.), in the Second Interim Commission Report, talking of the test, says:-

"My observations, therefore, clearly show "that Glycerine Broth does not differentiate "Tubercle Bacilli into two classes, and yields "no evidence that there is an essential dif- "ference in the action of different strains "of Tubercle Bacilli on Glycerine."

Wohler (106). and Washburn are inclined to agree that there are distinctive acid curves. Almost opposing views are also stated by Duval (20). and Lewis.(33.).

My own experience has been limited to 12 cases,/

cases, and in these I found the test thoroughly in keeping with what Smith has claimed for it. The Human Bacillus produced a curve of gradually increasing acidity; the Bovine Bacillus produced a curve in which the acidity steadily diminished.

Technique. Glycerine Bouillon was used, and its acidity in percentage of a normal solution was carefully calculated. The degree of acidity which I employed varied from ·1 to ·01%.

In my earlier experiments the medium was placed in Pasteur flasks, but later, upon the advice of Theobald Smith, I employed Jena Flasks (Ehrlenmeyer), with a capacity of 100 ccs. Into the sterilized flask a layer of Glycerine Bouillon 1½ ccs. deep was introduced; it is of extreme importance, in a number of comparative tests, to have exactly the same quantity of fluid in each. The medium in these flasks was inoculated. In making the inoculation care must be taken to suspend the tubercle upon the surface, if it sinks to the bottom the experiment is rendered useless; the best way to secure this is to grow the original culture upon an egg tube which contains a quantity of glycerine bouillon in its bottom;/

bottom; upon the glycerine bouillon a pellicle will extend from the egg, and with care it can be transferred to the fresh medium. If such a pellicle cannot be obtained, I have found a plan by which the inoculation can be made from an ordinary culture, it is just one of these little points which make all the difference between success and failure, and which only experience teaches.

If you dislodge large flakes from the surface of the original culture, and try to inoculate them upon the new fluid medium, you will find that they will sink in every case, but if you load the loop of a platinum needle with a number of small particles, and shake this over the surface, you will find that they will lie upon the surface, and if the process is repeated, a complete pellicle may be formed. The flask so inoculated is sealed with paraffin, and at intervals of 10 days a small quantity of the medium is drawn off and the acidity calculated by titration against N/20 solution of NaOH or HCl. Smith recommends that the medium be titrated when hot, and that it be diluted to 10% of its usual strength. The results are best demonstrated by being plotted out upon a curve. The drawback/

drawback of the test is the risk which one runs of a mixed infection, and the difficulty which sometimes is experienced in obtaining a proper pellicle. As I have said, I used the test in 12 different experiments, and in each case by means of it I was able to decide upon the type of organism under examination.

THE INOCULATION TEST.

It has long been noted that tuberculous material from different sources varied in its virulence for cattle and men. Villemin (1.), in 1868, remarked upon the difference, as applied to rabbits, and Orth (74.) found that feeding certain Bovine species upon Human tubercle produced only retrogressive lesions. Baumgarten (1.), using inoculation as a means of infection, found a similar result.

Theobald Smith (91-92.), however, was the first to formulate the matter into a test, and he published articles thereon in 1896 and 1898. Vagedes (100.) divided the Bacilli as regards virulence into three classes, but this view is now quite untenable. The test may be stated as follows:- If a rabbit be inoculated/

inoculated with a small, known quantity of Bacilli, it will react to the inoculation in different ways. If a Human Bacillus is introduced, the lesions produced are retrogressive and non-fatal. If a Bovine Bacillus, a fatal, acute, disseminated tuberculosis developes.

The amount inoculated has been the nucleus of considerable discussion. Smith, in some of his original experiments, used 1milligramme, the last Commission Report recommended ·1 milligramme, and in a note suggested even ·01 mgm. (intravenous). In my experiments I thoroughly investigated these points; a series was inoculated with 1 milligramme, a second with ·1 mgm. and a third with ·01 mgm, intravenously. I have no hesitation in recommending ·01 mgm., and the last series of my experiments has been carried out with that amount. With 1 mgm. and even with ·1 mgm. there is a possibility, vague, I grant [illegible], but nevertheless present, that the animal may be killed by a toxaemia, and a Human Bacillus confounded with a Bovine. If ·01 mgm. be employed, this possibility is prevented, and the lesions which develop in a Human case are slight and retrogressive, and in the Bovine type generalized and acute.

Technique/

Technique. A known quantity of the culture is obtained - the Commission recommend that the amount be calculated by the volumetric method, the calculation being made from the amount of deposit which appears when a known amount of the emulsified culture is centrifuged. I have employed this method, and my opinion is that it is unnecessarily complicated; in the majority of cases I have calculated the amount by weight. The culture, which ought to be dried over sulphuric acid is weighed to the extent of 1 milmilgamme; the weighed amount of culture is now made into a fine emulsion, and the emulsion made up to a certain amount with normal saline; the fluid is thoroughly shaken in order to disseminate the organism equally, and the necessary amount inoculated intra-venously, e.g., 1 mgm. of culture is made up to 100 ccs. with normal saline, and of this amount 1cc. is inoculated into the rabbit, an amount equal to ·01 mgm. of culture. Of course there is a considerable margin of error, but such is present in every method. I employed this test in every case, and it was the one to which I most securely pinned my faith. As I have said, in many of my cases, I experimented with three different amounts, and I found that ·01 mgm. was certainly the most satisfactory./

satisfactory. With this amount of Bovine Bacilli death occurs in from 6 to 8 weeks, and examination shows an intense dissemination of tubercle. With a Human Bacillus, the animal does not lose weight, and examination later shows the presence of a few scattered and retrogressive tubercles. A study of the weight chart is very useful; a steady fall in weight is pathognomonic of a Bovine infection, a constant weight, or even a rise in weight, is the sequel to a Human infection.

KNEE JOINT TEST.

This is a test which I myself introduced. The infection of a rabbit with a Bovine Bacillus produces an acute general disease, and if the original inoculation be made locally, e.g., subcutaneously, the local reaction is correspondingly acute. With a Human Bacillus the reverse holds good. It therefore occurred to me that use might be made of the comparative local reaction, if only it was possible to secure some situation in which the local infection could be appropriately demonstrated, without producing much in the way of a general reaction. After a number of experiments, I found the/

the desired situation in the knee joint.

From a joint the amount of absorption and the chances of a general dissemination are not great, and yet the synovial membrane is peculiarly well suited to show comparative degrees of reaction. 10

Technique. A quantity of Bacillary emulsion, pus, or other pathogenic material is slowly injected into the cavity of the knee joint through a hollow needle. Admission to the part is most readily gained by strongly flexing the joint, and inserting the needle by the side of the Ligamentum Patellae. I shall give a few details of experiments which illustrate the application of the test.

EXPERIMENT A.

A large white rabbit was inoculated into the knee joint with a quantity of Human Bacillary Emulsion.

PROGRESS OF RABBIT.

Date.	Weight.	State.
Feb. 10	700 gms.	Operation.
During 4 months duration.	920 gms.	-
	1000 gms.	-
	1020 gms.	Gaining weight.
	1000 gms.	-
	1030 gms.	-
	1130 gms.	Some diffuse swelling of joint.
	1400 gms.	-
May 15	1590 gms.	P.M. Examination.

This/

This animal underwent a steady increase in weight; the inoculated joint contained a slight excess of fluid; there was no evidence of pain, stiffness or rigidity in the limb. The rabbit ran about as usual.

POST MORTEM EXAMINATION.

GENERAL. Throughout the body generally there was no trace or sign of tubercle.

LOCAL. The right knee joint contained an excessive quantity of clear fluid; the synovial membrane was slightly thickened and myxomatous. Scattered throughout it there were tiny foci of tubercle. The articular cartilages were slightly eroded in places.

RESULT. Chronic synovial tubercle after a duration of four months.

EXPERIMENT B.

White rabbit inoculated into right knee joint with a quantity of Human Tubercle Emulsion.

PROGRESS/

PROGRESS OF RABBIT.

Date.	Weight.	State.
Feb. 10	900 gms.	Inoculated.
-	1000 gms.	-
-	1000 gms.	Gaining weight.
-	1200 gms.	-
-	1303 gms.	Slight swelling of joint.
-	1320 gms.	-
-	1300 gms.	-
-	1300 gms.	-
May 10	1379 gms.	Examined.

POST MORTEM EXAMINATION.

A. GENERAL. There was no evidence of tubercle - throughout the body.

B. LOCAL. The right knee joint contained a slightly excessive amount of fluid. There was a chronic synovial tubercle at the reflection of the membrane. The surrounding bone and cartilage were healthy.

RESULT. A chronic synovial tuberculosis of four months duration.

EXPERIMENT C.

Rabbit inoculated into right knee joint with a quantity of Human Bacillary Emulsion.

PROGRESS/

PROGRESS OF RABBIT.

Date.	Weight.	State.
Feb. 10	1700 gms.	Inoculated.
-	1750 gms.	-
-	1800 gms.	-
-	1920 gms.	Gaining weight.
-	2000 gms.	-
-	2107 gms.	-
-	2200 gms.	Slight swelling of joint.
-	2000 gms.	No limping.
June 10	2300 gms.	Examined.

POST MORTEM EXAMINATION.

A. GENERAL. There was no evidence of tubercle throughout the body.

B. LOCAL. The right knee joint contained an excessive amount of glairy fluid; the synovia were thickened with a chronic synovial tubercle; there was no disease of the cartilage.

RESULT. A chronic synovial tubercle (five months' duration).

One would summarise the results of these experiments by saying that inoculation of the rabbit's knee joint with Human tubercle produces an exceedingly chronic disease, without any general dissemination.

INOCULATION/

INOCULATION OF THE KNEE JOINT WITH BOVINE TUBERCLE.

EXPERIMENT A.

Slate rabbit, 2100 gms., inoculated into knee joint, December 4th.

PROGRESS.

Date.	Weight.	State.
Dec. 4	2100 gms.	Inoculated.
Dec. 10	2100 gms.	-
Dec. 15	2000 gms.	-
Dec. 20	1920 gms.	-
Dec. 25	1800 gms.	-
Dec. 30	1720 gms.	-
Jan. 4	1650 gms.	Killed.

Within 10 days after the original inoculation the joint apparently became uncomfortable, as the animal limped upon three legs, keeping the affected limb stiff and bent. Coincidentally the joint became distended with fluid. Weight was steadily lost. The animal was killed 30 days after the original inoculation.

POST/

POST MORTEM EXAMINATION.

A. GENERAL. There was very slight evidence of general tubercle, and it took the form of several follicles in kidneys and lungs.

B. LOCAL. (See illustration[s] No[s]. 135-136). The knee joint was distended with caseous material, and all the pouches and diverticula of the joint are so affected. The synovial membrane was simply riddled with rapidly caseating tubercles. The cartilages were showing signs of destruction, and the bone beyond was in process of being invaded.

RESULT. Acute synovial tuberculosis (30 days).

EXPERIMENT B.

Small white rabbit inoculated into left knee joint, December 4th. Weight, 2300 gms.

PROGRESS.

Date.	Weight.	State.
Dec. 4	2300 gms.	Inoculated.
Dec. 7	2300 gms.	-
Dec. 9	-	Animal died.

POST/

POST MORTEM EXAMINATION.

A. GENERAL. The cause of death was obviously an acute enteritis.

B. LOCAL. Even at this early stage, i.e., 5 days after inoculation, the knee joint was distended and contained in its interior an excessive quantity of fluid. Scattered through the synovial membrane were early discrete grey points, apparently developing tubercles.

RESULT. Early acute synovial tuberculosis (5 days).

EXPERIMENT C.

Large white rabbit, weight 3000 gms., inoculated into left knee joint, December 4th.

PROGRESS.

Date.	Weight.	State.
Dec. 4	3000 gms.	Joint inoculated.
Dec. 7	3010 gms.	-
Dec. 10	2980 gms.	Knee joint swollen.
Dec. 13	2700 gms.	Painful; Rabbit crippled.

Animal died, December 13th.

POST/

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POST MORTEM EXAMINATION.

A. GENERAL. Throughout the body there were one or two evidences of tubercle in the shape of a few caseating foci at the bases of both lungs.

B. LOCAL. (See illustration No. 134.). Ten days after the original inoculation, the joint was full of fluid, containing a number of purulent flakes. The synovial fringes were red and dotted all over with numerous follicles - many of them early caseating ones. The disease was most marked at the reflection, and around the Ligamenta Alaria and the Ligamentum Mucosum. The cartilages and bone were healthy.

RESULT. An acute synovial tuberculosis (10 days).

SUMMARY OF RESULTS.

Inoculation of the knee joint of a rabbit with Bovine tubercle produces an acute synovial tubercle, so acute that, in 30 days' interval, it has begun to destroy the articular cartilages and attack the bones.

The two former series of experiments were performed with cultures which had already been proved to be Human and Bovine.

Thereupon/

Thereupon a third series of experiments was performed, in which pathogenic material containing tubercle of an unknown type was inoculated into the joint, the experimental result being confirmed by the usual tests.

EXPERIMENT A.

Rabbit inoculated into left knee joint with a quantity of pus from P.D.

PROGRESS :—

Date.	Weight.	State.
Dec. 20	1920 gms.	Inoculated.
Dec. 27	1900 gms.	-
Jan. 2	1900 gms.	-
Jan. 6	1850 gms.	Killed.

Killed 17 days after.

POST MORTEM EXAMINATION.

A. GENERAL. There are several small tubercles in the lungs and in the kidneys.

B. LOCAL. The synovial membrane of the knee joint is distended with caseous débris. The synovial membrane is intensely congested and studded all over with caseating tubercles. The cartilages are just beginning to be attacked.

RESULT./

RESULT. An acute synovial tubercle, resulting after an interval of 17 days. The reaction is proof of the fact that the Bacillus inoculated was Bovine in type, and this test was later confirmed by animal inoculation.

EXPERIMENT B.

Left knee joint of rabbit inoculated with pus from Baby H.

PROGRESS OF RABBIT.

Date.	Weight.	State.
Dec. 10	1500 gms.	Inoculated.
Dec. 20	1600 gms.	-
Dec. 30	1680 gms.	-
Jan. 10	1720 gms.	Gaining weight.
Jan. 30	1680 gms.	-
Feb. 14	1700 gms.	-
Feb. 28	1732 gms.	No change
Mar. 30	1740 gms.	Excess of fluid in joint.
Apr. 10	1760 gms.	Examined.

POST MORTEM EXAMINATION.

A. GENERAL. There was no evidence of tubercle throughout the body.

B. LOCAL. The knee joint showed the appearances of a chronic synovial tubercle. The synovia were slightly thickened, and there were a few scattered/

scattered follicles.

RESULT. A chronic synovial tuberculosis. The reaction is proof of the fact that the disease was produced by a Bacillus of the Human type. The test was later confirmed by animal inoculation.

SUMMARY OF THE EXPERIMENTS.

A. Just as the general reaction of the rabbit to infection by the Human or Bovine Bacillus varies greatly in degree, so does the local reaction.

B. The best situation in which to demonstrate a local reaction is one of the joints, for two reasons, firstly, because the risk of general absorption is small, and secondly, because the synovial membrane readily demonstrates different degrees of infection.

C. Infection of the knee joint of a rabbit with the Bovine Bacillus produces an intense and marked reaction, infection of the knee joint with a Human Bacillus produces a prolonged and chronic infection.

As a test it has got distinct advantages:-

1. The amount of organism which is injected need not be carefully estimated.

2./

2. A result is obtained sooner than in any other test.

3. The material which is used for inoculation need not necessarily be a Bacillary Emulsion, pus, caseous débris, in fact any material which contains tubercle Bacilli and is free from a mixed infection - this is important, as it is conceivable that an acute infection would disguise the synovial changes.

HISTOLOGICAL TEST.

Theobald Smith has shown that the histological changes of the lung in the development of tubercle may be used as a test. After intra-venous injection, if the lungs are infected with a Human Bacillus, the tubercles which result are epithelioid in type, without any caseation until late in the disease. If the Bovine Bacillus be used, the tubercles show an early spreading central caseation.

I have occasionally employed the test, but it is not one upon which any degree of dependence can be made.

I/

I shall now give an outline of the scheme which I myself adopted in differentiating the type of Bacillus.

The pathological material was obtained directly from the operating theatre or post-mortem room, and inoculated immediately into a guinea-pig; usually beneath the skin of the flank. Tuberculosis developed in the animal, more especially in the glands and spleen. Four to six weeks after the original inoculation, the animal was killed, and cultures made upon Egg medium from all the different sources. After four weeks incubation, the tubes usually demonstrated sufficient growth for the tests to be carried out.

In the earlier experiments I performed a consecutive series of five tests, namely:-

A. The original Culture test.

B. The Morphological test.

C. The Special Culture test (Glycerine).

D. Smith's test.

E. The Rabbit Inoculation test.

The first three tests were not looked upon as absolute, but taken in conjunction with the others, they aided in the differentiation.

Smith's/

Smith's test was employed in 12 cases, it was found to be thoroughly reliable, but as it was exceedingly complicated and difficult, it was not further employed.

The inoculation test was made use of on every occasion, and the problem as to which amount was the most suitable, 1 mgm., ·1 mgm. or ·01 mgm., was worked out in different series of cases. The final conclusion was that ·01 mgm. was the proper amount to employ in the test.

In many of the cases the knee joint test was employed as confirmatory of the others, occasionally also the histological test was used.

It would be of advantage to give at this point in detail the accounts of these cases, and the history of the separation of the organism. For the sake of example, I shall quote (1) the history of a Human type of Bacillus, (2) the history of a Bovine type of Bacillus, and (3) the history of a case in which both organisms were present. Full details of each experiment are given in the appendix. The cases which I shall quote are those of No. 1, No. 5 and No. 49.

16

CASE NO. 1.

H.M. $10\frac{4}{12}$ years.

HISTORY. The illness began 7 months ago, with pain in the right hip and knee, and the development of a limp on walking. No treatment was adopted. Pain increased and an abscess developed. Examination showed tuberculous disease of the right hip joint.

FAMILY HISTORY. The father has pulmonary tuberculosis. Mother and seven children are healthy.

PREVIOUS HISTORY. Breast fed child; had measles, but no other disease.

Admitted July 18th.

July 20th, an operation was performed, the head of the femur excised and the hip joint found to be filled with synovial tubercle. The articular cartilages were eroded, and there was some disease in the acetabulum.

July 20th. A portion of the synovial tissue was inoculated into an animal.

PROGRESS/

PROGRESS OF ANIMAL.

Date.	Weight.	State.
July 20	1560 gms.	Inoculated.
Aug. 1	1500 gms.	-
Sep. 1	1400 gms.	-
Sep. 20	1200 gms.	Losing weight slightly.
Sep. 30	1200 gms.	-
Oct. 10	1100 gms.	-
Oct. 15	950 gms.	Killed & Examined.

The history of the animal showed the progress of a chronic infection.

POST MORTEM EXAMINATION.

The left groin glands were tuberculous and caseating, also both axillary glands.

THORAX. Both lungs contained a number of small epithelioid follicles. The peri-bronchial glands were healthy.

ABDOMEN. There was no evidence of tubercle in any of the abdominal viscera.

Cultures were made upon Egg Medium from all the available sources.

December 1st. With one exception, all the available tubes showed active tuberculous growths.

TESTS./

17

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

The organism grew with unusual rapidity, and by its growth formed a piled up and foliaceous mass upon the surface of the medium. It had a faint pinkish colour and a crinkled appearance. The characters were in keeping with those of the Human Bacillus.

B. MORPHOLOGICAL CHARACTERS OF THE BACILLUS.

The Bacilli are long - they stain equally and readily; there are no branching forms. Some of them show distinct nodular staining. The characters are in keeping with those of the Human Bacillus.

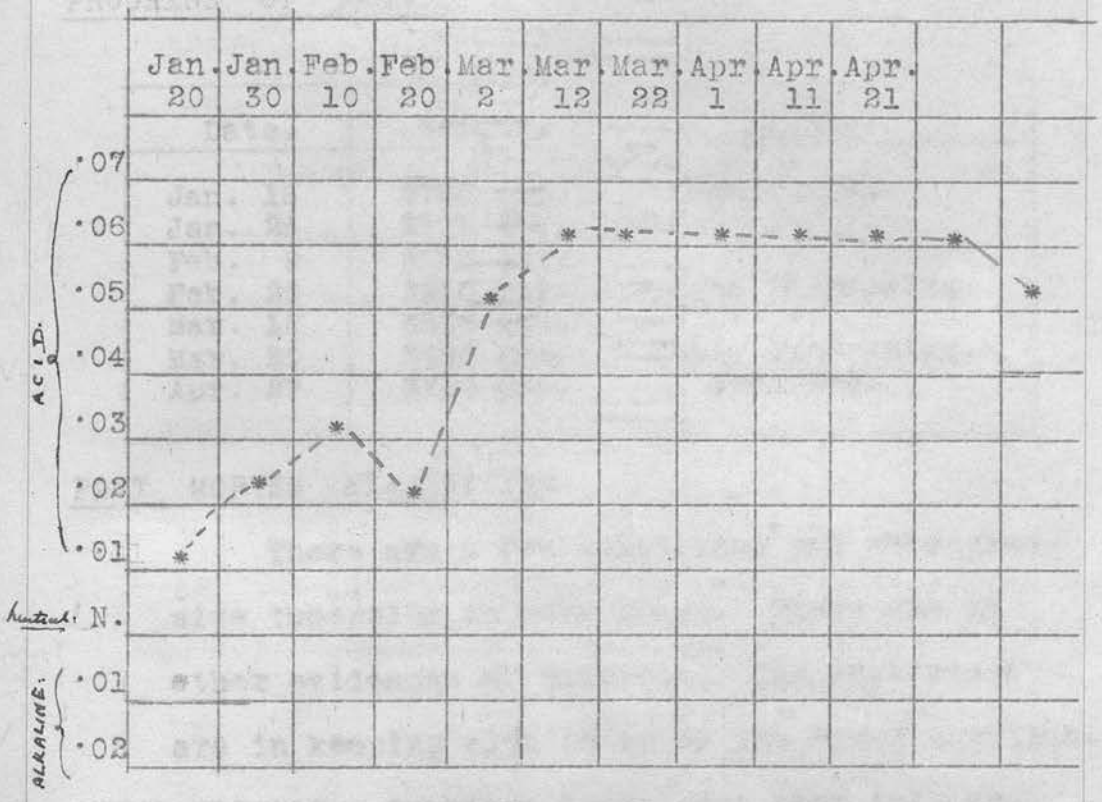
C. SPECIAL CULTURE REACTION.

At the end of 15 days a copious growth appeared upon the Glycerine Egg tubes. The growth was considerably more profuse than that upon the control plain Egg tubes.

D. SMITH'S TEST.

Flask containing Glycerine Bouillon inoculated/

inoculated January 20th.



Smith's test shows a steadily increasing rise in acidity from ·01 to ·06. Characters in keeping with the Human Bacillus.

E. INOCULATION TEST.

January 18th. Rabbit inoculated with ·1 mgm. of Tubercle Bacilli.

PROGRESS/

PROGRESS OF RABBIT.

Date.	Weight.	State.
Jan. 18	2780 gms.	Inoculated.
Jan. 25	2777 gms.	-
Feb. 9	3050 gms.	-
Feb. 20	3250 gms.	Weight increasing.
Mar. 10	3300 gms.	-
Mar. 20	3420 gms.	Still increasing.
Apr. 27	3700 gms.	Examined.

POST MORTEM EXAMINATION.

There are a few epithelioid and retrogressive tubercles in both lungs. There are no other evidences of tubercle. The characters are in keeping with those of the Human Bacillus.

FINAL RESULT. Combined tests show that this organism is of the Human type.

CASE NO. 5.

T.B. 7 years.

HISTORY. Nine weeks before admission pain was complained of in the right knee joint. A swelling gradually appeared, with all the accompaniments of tuberculous disease.

PREVIOUS HISTORY. Bottle fed baby; milk unboiled; no other illness.

FAMILY/

FAMILY HISTORY. Father and mother are healthy; there is a history of syphilis, no history of tubercle.

December 1st, the knee joint was excised; there was found to be pure synovial disease, without any trace of disease in the bone. Some of the diseased tissue was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 1	458 gms.	Inoculated.
Dec. 19	468 gms.	-
Dec. 22	490 gms.	No change.
Jan. 3	350 gms.	Losing weight rapidly.
Jan. 9	354 gms.	-
Jan. 20	370 gms.	Examined.

POST MORTEM EXAMINATION.

There was considerable general wasting; there was a tuberculous tumour at the site of inoculation; the groin glands upon both sides were tuberculous.

THORAX. Both lungs were riddled with tubercles, most of them rapidly caseating; the bronchial glands were tuberculous.

ABDOMEN. There were tubercles in the liver and spleen; the retro-peritoneal glands were tuberculous/

tuberculous.

Cultures were made from all the possible available sources.

TEST A. APPEARANCE OF ORIGINAL CULTURE.

The organism grew slowly, and when it did so it was in the form of a diffuse, ground glass appearance, spreading over the surface of the medium; the culture was exceedingly difficult to disassociate. Characters in keeping with the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

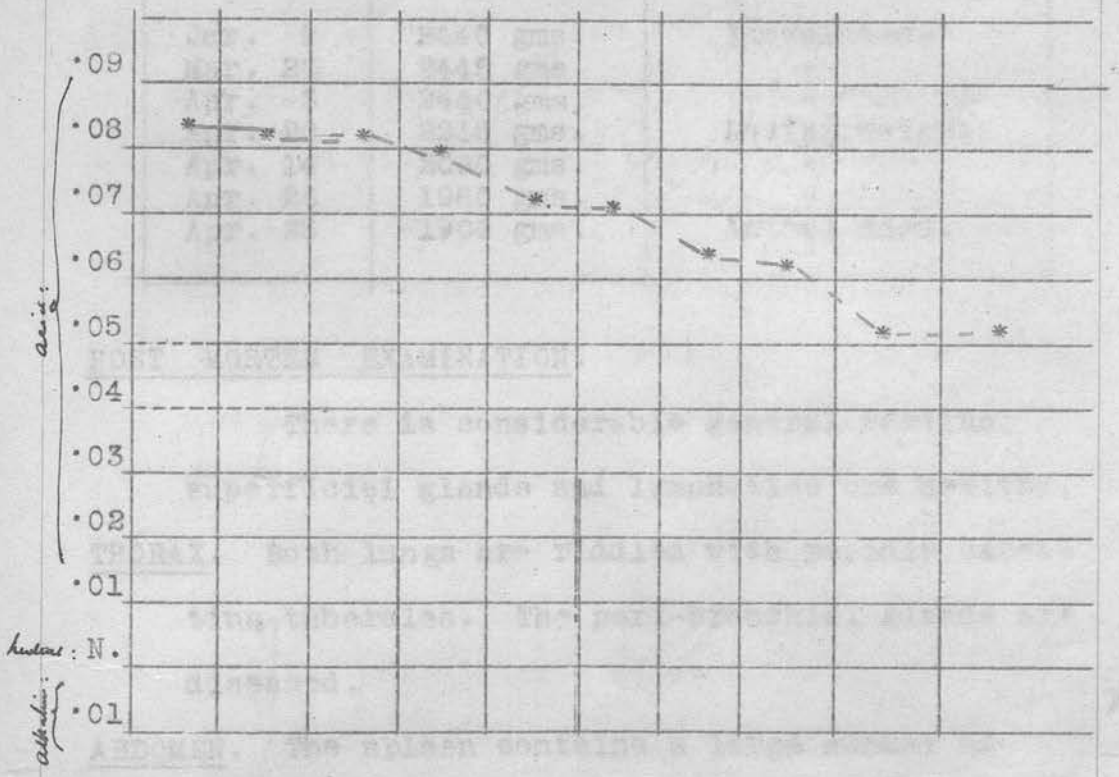
Very short Bacilli; they stain equally and rapidly. There is no appearance of nodular staining, and there are no branching or aberrant forms. Characters in keeping with the Bovine Bacillus.

C. SPECIAL CULTURE TEST.

The primary sub-culture upon Glycerine Egg grew languidly and imperfectly; the contol cultures upon plain Egg grew more luxuriantly. Characters in keeping with those of the Bovine Bacillus.

D./

D. SMITH'S TEST.



The medium showed a progressive decrease in acidity from ·09 to ·05. Characters in keeping with those of the Bovine Bacillus.

E. INOCULATION TEST.

March 2nd. Rabbit inoculated with ·01 mgm. of tubercle.

PROGRESS/

PROGRESS OF RABBIT.

Date.	Weight.	State.
Jar. 2	2440 gms.	Inoculated.
Mar. 20	2445 gms.	-
Apr. 3	2440 gms.	-
Apr. 20	2218 gms.	Losing weight.
Apr. 14	2000 gms.	-
Apr. 20	1960 gms.	-
Apr. 25	1900 gms.	Animal died.

POST MORTEM EXAMINATION.

There is considerable general wasting; superficial glands and lymphatics are healthy.

THORAX. Both lungs are riddled with rapidly caseating tubercles. The peri-bronchial glands are diseased.

ABDOMEN. The spleen contains a large number of tubercles. The liver is also tuberculous. There are numerous tubercles in the liver and the right testis. The retro-peritoneal glands are diseased. An acute disseminated Tuberculosis.

GENREAL RESULTS. The tests imployed show that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT/

EXPERIMENT NO. 49.

P.M. 1 3/12 year.

HISTORY. Until 6 months ago the child was quite healthy; a swelling then appeared over the right hip, and all manner of movement became painful. The limb gradually assumed an abnormal position, and the child was admitted to Hospital.

PREVIOUS HISTORY. Child was brought up on cows' milk. Has previously suffered from multiple cold abscesses and otorrhoea.

FAMILY HISTORY. Father and mother are well; there is a family history of tubercle upon both father's and mother's sides.

August 27th. The hip was excised, and a portion of the diseased tissue inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Aug. 27	462 gms.	Operation.
Sep. 10	468 gms.	-
Sep. 20	450 gms.	-
Sep. 30	434 gms.	-
Oct. 10	420 gms.	-
Oct. 17	400 gms.	-
Oct. 24	360 gms.	-
Oct. 28	340 gms.	-
Oct. 30	320 gms.	Animal died.

POST/

POST MORTEM EXAMINATION.

There was found to be tuberculosis of the groin and axillary glands.

THORAX. Both lungs cntained a number of small spitheloid tubercles.

ABDOMEN. The spleen was tuberculous; there were tubercles in the liver and disease of the retro-peritoneal glands.

TESTS. A. CHARACTERS OF THE ORIGINAL CULTURE.

The original ordinary egg culture grew quite readidy, in fact [illegible] profusely, upon ordinary egg. Characters of the Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

All varieties of T.B. Bacilli ; some are short and some are long ; the long forms stain well, marked nodular staining; the small ones are squat and uniform. Characters doubtful.

C. SPECIAL CULTURE TEST.

The growth upon Glycerine Egg is distinctly profuse, much more so than the growth upon Ordinary Egg; piled up masses, white in colour. Characters of the Human Bacillus.

D. INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS/

PROGRESS OF RABBIT.

Date.	Weight.	State.
Jan. 5	2100 gms.	Inoculated.
Jan. 10	2000 gms.	-
Jan. 22	1800 gms.	Losing weight.
Jan. 26	1600 gms.	-
Jan. 29	1600 gms.	Animal died.

POST MORTEM EXAMINATION.

Considerable general wasting. No involvement of the lymph glands.

THORAX. Both lungs are simply solid with tubercles, many of the tubercles being rapidly caseating ones.

ABDOMEN. Liver contains thousands of tubercles. Spleen enlarged and riddled. Both kidneys contain large numbers of tubercles.

RESULT. An acute dissemination of Tuberculosis.

The differentiation of the organism in this last case is especially interesting, because Human and Bovine types are present.

The Bovine Bacillus is present, because the inoculated animal died of Acute Tuberculosis. The Human Bacillus is present, because there was such a profuse growth upon the Glycerine Egg Medium.

Morphological/

Morphological Characters were also in keeping with such a mixed infection.

I have outlined these cases, because they show in detail each step in the differentiation of the organism.

C. RESULTS OF INVESTIGATIONS UPON 70 CASES OF BONE AND JOINT TUBERCULOSIS OCCURRING IN CHILDREN TWELVE YEARS OF AGE AND UNDER.

The last Report of the Commission published an account of 14 cases of Bone and Joint Tubercle, in which they had succeeded in identifying the type of the Bacillus. In thirteen of the cases the organism was found to be of the Human type, in the fourteenth and last case, a mixed virus was present, the Human Bacillus and the Bovine Bacillus.

Park and Krumwiede (77.) investigated a series of five joint cases, and in each the Human Bacillus was present.

I make no excuse for bringing to your notice a study of seventy cases of Bone and Joint Tubercle in this relation. I consider it to be of outstanding/

outstanding interest for several reasons. (1) The series forms a much greater number than has ever before been investigated. (2) the material is essentially a specialized one, being drawn (with three exceptions) from children 12 years of age and under. (3) the results are of such outstanding importance as to thoroughly outweigh the various expenditures which have been necessary.

Full details of each case are given in the Appendix. I have decided not to introduce such here, because their perusal is necessarily laborious, and no useful purpose would be served; but what I have done is to tabulate each case, giving in a graphic arrangement the important points of each.

I now state the analysis of these cases:-

ANALYSIS/

ANALYSIS OF CASES.

No.	Case.	Age. Years.	Disease.	Fam. History.	Milk Supply.	Organism. Culture.	Morpho-logy.	Special Test.	Smith's Test.	Inoculation.	Result.
1.	H.M.	10 4/12	T.B. Hip	Pul. Tubercle	Breast fed	Human	Human	Human	Human	Human	Human
2.	A.T.	2½	T.B. Hip	Pul. Tubercle	Breast fed	Human	Bovine	Human	Human	Human	Human
3.	M.C.	6	T.B. Hip	Pul. Tubercle	Breast fed	Human	Human	Human	Human	Human	Human
4.	W.B.	7 1/12	T.B. Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
5.	J.R.	7	T.B. Knee	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
6.	B.P.	3½	T.B. Elbow	Nil	Breast fed	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
7.	M.L.	7 3/12	T.B. Knee	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
8.	M.C.	10	T.B. Dactylitis	Pul. Tubercle	Breast fed	Human	?	Human	Human	Human	Human
9.	J.F.	11/12	T.B. Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
10.	D.D.	5	T.B. Knee	Pul. Tubercle	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
11.	J.F.G.	1 7/12	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
12.	J.V.	3	T.B. Ankle	Pul. Tubercle	Mixed	Human	?	Human	-	Human	Human
13.	A.M.	2 10/12	T.B. Femur	Nil	Mixed	Bovine	Bovine	Bovine	-	Bovine	Bovine
14.	H.T.	6 6/12	T.B. Tarsus	Nil	Breast fed	Human	Human	Human	-	Human	Human
15.	G.Y.	2 10/12	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	?	-	Bovine	Bovine
16.											

ANALYSIS OF CASES.

No.	Case.	Age. Years.	Disease.	Fam. History.	Milk Supply.	Organism. Culture.	Morphology.	Special Test.	Smith's Test.	Inoculation.	Result.
16.	M.G.	9/12	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
17.	M.S.	10/12	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
18.	F.B.	3	T.B.Knee	Nil	Breast fed	Bovine	Bovine	Bovine	-	Bovine	Bovine
19.	A.R.	7/12	T.B. Dactylitis	Nil	Bottle fed*	Bovine	Bovine	Bovine	-	Bovine	Bovine
20.	G.S.	4 7/12	T.B.Tibia	Pul.Tubercle	Mixed	Bovine	Bovine	Bovine	-	Bovine	Bovine
21.	K.R.	3	T.B.Skull	Nil	Breast fed	Human	Human	Human	-	Human	Human
22.	W.B.	2½	T.B. Dactylitis	Nil	Mixed	Bovine	?	Bovine	-	Bovine	Bovine
23.	D.D.	1 7/12	T.B.Ankle	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
24.	A.N.	1 10/12	T.B. Humerus	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
25.	W.B.	8	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
26.	J.L.P.	6	T.B.Knee	Pul.Tubercle	Breast fed	Human	Human	Human	-	Human	Human
27.	J.R.	2 4/12	T.B.Ankle	Viscous T.B.	Breast fed	Bovine	?	Bovine	-	Bovine	Bovine
28.	G.N.	3	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
29.	A.M.	2	T.B.Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
30.	M.P.	4	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
31./											

*Tubercle Bacilli were found in this cow's udder.

ANALYSIS OF CASES.

No.	Case.	Age. Years.	Disease.	Fam.History.	Milk Supply.	Organism. Culture.	Morpho-logy.	Special Test.	Smith's Test.	Inoculation.	Result.
31.	G.B.	10 11/12	T.B.Elbow	Nil	Cows' milk	Human	Human	Human	-	Human	Human
32.	M.E.*	1 5/12	T.B.Tarsus	Nil	Cows' milk	Human	Human	Human	-	Bovine	B.& H.
33.	D.A.	1 3/12	T.B.Knee	Pul Tubercle	Cows' milk	Bovine	Bovine	Bovine	-	Human	Human
34.	A.D.	7	T.B.Ilium	Nil	Mixed	Bovine	Bovine	Bovine	-	Bovine	Bovine
35.	M.D.	3	T.B.Tarsus	Nil	Mixed	Bovine	?	Bovine	-	Bovine	Bovine
36.	D.D.	1 5/12	T.B.Ankle	Pul.Tubercle	Breast fed	?	?	Human	-	Human	Human
37.	J.G.	12	T.B.Malar	Pul.Tubercle	Cows' milk	Bovine	?	Bovine	-	Bovine	Bovine
38.	J.R.	1 4/12	T.B.Tibia	Nil	Breast fed	Bovine	Bovine	Bovine	-	Bovine	Bovine
39.	J.C.	8	T.B. Hip	Gland Tubercle	Breast fed	Human	?	Human	-	Human	Human
40.	A.M.	2 8/12	T.B.Elbow	Nil	Breast fed	Bovine	Bovine	Bovine	-	Bovine	Bovine
41.	W.S.C.	3	T.B.Femur	Pul.Tubercle	Cows' milk	Bovine	?	Bovine	-	Bovine	Bovine
42.	W.B.	7 1/12	T.B. Jaw	Pul.Tubercle	Cows' milk	Human	Human	Human	-	Human	Human
43.	J.F.	1 8/12	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
44.	D.S.	4	T.B. Hip	Pul.Tubercle	Breast fed	Human	Human	Human	-	Human	Human
45.	W.W.	2 11/12	T.B.Skull	Nil	Cows' milk	Human	Human	Human	-	Bovine	H.& B.
46.											

*This case is due to a double infection, Human and Bovine; for details see Appendix, p.

ANALYSIS OF CASES.

No.	Case.	Age. Years.	Disease.	Fam. History.	Milk Supply.	Organism. Culture.	Morpho-logy.	Special Test.	Smith's Test.	Inocu-lation.	Result.
46.	W.H.S.	2	T.B. Hip	Nil	Mixed	Bovine	?	Bovine	-	Bovine	Bovine
47.	H.M.	$10\frac{11}{12}$	T.B. Hip	Pul. Tubercle	Breast fed	Bovine	?	Bovine	-	Bovine	Bovine
48.	H.C.	7	T.B. Hip	Nil	Cows' milk	?	Bovine	Bovine	-	Bovine	Bovine
49.	P.M.	$1\frac{3}{12}$	T.B. Hip	Pul. Tubercle	Cows' milk	Human	Mixed	Human	-	Bovine	H.& B.
50.	P.M.	5	T.B. Knee	T.B. Meningitis	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
51.	A.D.	4	T.B. Femur	Nil	Breast fed	Bovine	Bovine	Bovine	-	Bovine	Bovine
52.	J.F.	$5\frac{8}{12}$	T.B. Hip	Nil	Breast fed	Human	Human	Human	-	Human	Human
53.	P.M.	$3\frac{1}{2}$	T.B. Dactylitis	Nil	Breast fed	Human	Human	Human	-	Human	Human
54.	R.S.	$3\frac{1}{2}$	T.B. Dactylitis	Pul. Tubercle	Breast fed	Human	Human	Human	-	Human	Human
55.	K.C.	7	T.B. Knee	Pul. Tubercle	Breast fed	Human	Human	Human	-	Human	Human
56.	J.F.	3	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
57.	R.F.	5	T.B. Ankle	Pul. Tubercle	Breast fed	?	Human	Human	-	Human	Human
58.	B.S.C.	5	T.B. Femur	Nil	Breast fed	Human	Human	Human	-	Human	Human
59.	J.R.	4	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
60.	E.F.	30	T.B. Dactylitis	Tubercle	?	Human	Human	Human	-	Human	Human
61.											

ANALYSIS OF CASES.

No.	Case.	Age. Years.	Disease.	Fam. History.	Milk Supply.	Organism. Culture.	Morpho-logy.	Special Test.	Smith's Test.	Inocu-lation.	Result.
61.	N.C.	25	T.B. Vertebra	Nil	?	Human	Human	Human	-	Human	Human
62.	A.C.	24	T.B. Ankle	Tubercle	?	Human	Human	Human	-	Human	Human
63.	P.D.	3	T.B. Femur	Gland Tubercle	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
64.	P.R.	4	T.B. Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
65.	R.C.	8½	T.B. Ankle	Pul. Tubercle	Breast fed	Human	Human	Human	-	Human	Human
66.	S.N.	4	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
67.	D.S.	2	T.B. Os Calcis	Nil	Cows' milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
68.	W.B.	8	T.B. Hip	Nil	Mixed milk	Bovine	Bovine	Bovine	-	Bovine	Bovine
69.	T.F.	4	T.B. Hip	Nil	Breast fed	Human	Human	Human	-	Human	Human
70.	R.F.	5	T.B. Ankle	Pul. Tubercle	Breast fed	Human	Human	Human	-	Human	Human

E P I T O M E.

AGE. With three exceptions, the cases have been below 12 years of age, and it is interesting to note that the three cases which have exceeded that age have been infected with the Human Bacillus.

The age question is important, because if one can show (and I have succeeded in showing), that a considerable proportion of children are infected with the Bovine Bacillus, it suggests to one's mind that there must be some obvious consideration to explain the fact. Among children, and more especially Scotch children, the staple article of diet during the first twelve years of life is cows' milk, and it has been found, time and again, that the ingestion of cows' milk infected with the Bovine Bacillus is the main responsible cause in the development of Bovine Tuberculosis in Man - therefore I think the strictest logician will grant that when there is reason to suspect a considerable infection of the milk supply, there will be a correspondingly great proportion of Bovine Tuberculosis.

The mesenteric lymphoid arrangements of the child are of such a nature, that they must offer less/

less resistance to the entrance of the Bacillus than is the case later, for there is no doubt that the proportional occurrence of Bovine Tubercle diminishes with age, and diminishes in a more rapid proportion than would be explainable by the question of food.

FAMILY HISTORY.

Out of the total of 70 cases, 21 of them recorded a family history of Pulmonary Tuberculosis affecting some near relation, usually the father or mother, and of these 21, 15 of them, when examined, were found to possess a Bacillus of the Human type; the remaining 6 were due to the action of the Bovine Bacillus. In the 15 cases of Human Tubercle, the path of infection was perfectly clear.

In one instance there was a family history of osseous tubercle, and the organism was found to be a Bovine one. A tuberculous meningitis history accompanied a Bacillus of a similar type, as did also a history of gland tubercle. But the all-important feature in the question of Family History lay in the fact that, when a Human Bacillus was found to be the cause of the disease, there was a striking Family History of Pulmonary Tubercle - there was an obvious source from which the Human Organism could

be/

be traced.

MILK SUPPLY.

This question will employ my attention more fully presently. I shall speak of it now in its local application. In each case care was taken to obtain all possible details regarding the source of the milk supply, and it might naturally be divided into the two classes, human milk and cows' milk. There was a third class, and of course the largest class, in which the child was nourished upon both human and cows' milk. It was instructive to notice that in no case was any means taken to render the cows' milk pasteurised or sterilized. That class in which only human milk was given may be neglected; it consists of one or two of the very young children; and one is left really with two classes, that fed entirely upon cows' milk, and that fed upon a mixture of human and cows' milk. There existed, therefore, in practically every case, a possible source through which a milk (Bovine)infection might occur.

THE ORGANISM.

The type of each organism was proved in the manner I have detailed, and it was found that in 41 instances the Bovine Bacillus was present;

in/

in 26 cases the Human Bacillus was at fault, and in 3 cases a mixture of Human and Bovine Bacilli occurred. Expressed in percentages, 60% are Bovine in origin, 37% are Human, and the remaining 3% contain both types of the Bacillus.

A moment's consideration cannot fail to impress one with the fact of the importance of these figures. In the 41 Bovine cases, this infection had originally occurred through the ingestion of infected milk. In some instances the Bovine Bacillus had been recovered from the milk upon which the child was being nourished, and at a later date a Bovine organism was isolated from the pathological lesion, and there were many such instances in which the chain was complete. Of course in every one of the cases the inference was obvious. Now no one will deny that milk infected with the Tubercle Bacillus is a remediable fault, and had means been taken to apply any of the applicable remedies, 60% of the disease would have been prevented.

The figures speak for themselves; they are the strongest argument which one can bring forward; and certainly they ought to afford very considerable food/

food for thought.

The Human Bacillus has been responsible for 37% of the disease, in many of the cases there has been inherited a natural tendency towards the condition, but with the exception of 5 cases the history shows that there was an obvious direct source of infection, in the shape of a tuberculous fellow-resident, a very strong argument in favour of the isolation of Pulmonary Tuberculosis.

Therefore, I consider one is justified in making the statement that compulsory isolation of Phthisis, and the rigid enforcement of milk inspection would abolish the direct causes of every case of Bone and Joint Tubercle I have detailed.

D. EXPLANATION OF THE RESULTS; MORE EXPECIALLY IN THEIR BEARING UPON MILK SUPPLY.

I am taking as the text of this portion of the discussion the fact that 60% of Bone and Joint Tubercle in children is due to the action of the Bovine Bacillus. It has been known for many years that milk drawn from a cow infected with Tuberculosis of the udder contains enormous numbers of Tubercle Bacilli, and recent researches have shown that it is

possible/

possible for Tubercle Bacilli to be excreted in the milk, without the udder being actually diseased.

Milk so infected of necessity proves an undoubted menace to the well-being of the consumers. It has been said that Man is at his best when he is putting the wrong right, and I shall make it my business to show that he is here face to face with one of the most glaring discrepancies of our age. The whole trend of scientific minds is towards the elucidation and the amelioration of the various burdens under which the human race is placed, and the fortunate individual who is able,by some stroke of fortune, or by sheer ability, to minimise the dangers of our existence, is lauded as a hero and honoured as a friend. It would seem impossible, then, that a scientific nation like ours would apparently be content to live under the burden of a perfectly remediable risk, and yet such is the case. 60% of Bone and Joint Tubercle due to the action of the Bovine Bacillus - and that Bacillus ingested in milk - are any other facts needed to show the preposterousness of the evil?

In 1885, an order was passed by the authorities, which laid down certain rules by which animals/

animals infected with certain diseases were to be inspected by veterinary surgeons. It was called "The Dairies, Cowsheds and Milkshops Order". In 1899, when the question of tubercle was beginning to absorb public interest, the order of 1885 was so amended, that Local Authorities were empowered to order that the milk of tuberculous cows:-

A. Shall not be mixed with other milk.

B. Shall not be sold or used as human food.

C. Shall not be sold or used as food for swine or other animals, unless and until it has been boiled.

It was left to the discretion of Local Authorities to put the order into application.

In the usual Returns, it would appear as though these orders were being carried out to some purpose. I give a short table obtained from the Local Government Board, which gives Returns for six consecutive years, 1900 to 1905. (Scotland).

Year.	Cows Examined.	Affected.	Percentage.
1900	20,076	54	·268%
1901	22,604	46	·203%
1902	26,382	40	·151%
1903	29,870	40	·134%
1904	29,305	37	·126%
1905	38,309	43	·112%

According/

According to this return, there would appear to be an excellent system of inspection, and a comparatively small and negligible percentage of Tuberculosis, but I may be permitted to state yet another table, which is even of greater interest, in so far as it rends a portion of the veil wich some would fain keep intact. The table is one showing the actual number of cows which have been supplying milk in Scotland, and in addition, the number of cows which have been actually examined and tested for Tuberculosis.

Year.	Total Cows.	Examined Cows.	Unexamined Cows.
1900	434,264	20,076	414,188
1901	433,981	22,604	411,377
1902	438,890	26,382	412,408
1903	437,418	29,870	407,548
1904	439,358	29,350	410,053
1905	437,138	38,309	398,829

Taking the last year in which these results were published, 1905; 9% of the cows were examined for tubercle, while the remaining 91% went free, and presuming that the proportion of tuberculous cows in the unexamined cattle is in the same ratio/

ratio as in the examined, there would have been 1068 cows in the year 1905, whose business it was to disseminate broadcast untold numbers of virulent Tubercle Bacilli.

It is a picture worthy of a Dante, and yet it is no fairy tale. Into how many homes disease and death have entered through these portals, it is harrowing to imagine.

These facts are no new development of an advancing age; they are synonymous with an evil which has existed probably as long as cows' milk formed a staple food of man, but the thing which is difficult to believe is the fact that this glaring evil is being allowed to flourish as prominently as ever.

If it could only be brought home to the lay mind the enormous risk which is run in nourishing children upon unproved milk, the so-called attempts at improvement would not be so half-hearted as they are.

Is it possible to imagine that milk infected, let us say, with the Diphtheria Bacillus, would for one moment be permitted to remain in use? A whisper of such, and the sleuth-hounds are at once on the track of the wretched Bacillus. But it

is/

is a matter too serious for joking.

Diphtheria, I grant, [illegible] is an acute disease and an infectious disease, but in its mortality and in the train of disaster and deformity which follows in its wake, it cannot be considered, when compared with Bovine Tubercle, and yet there are hundreds of cows at the present moment disseminating untold millions of an organism as deadly as Death itself. I do not wish to paint any exaggerated picture, but what is the tableau one so often sees? A pretty, fair-haired child, rosy-cheeked and blue-eyed, stout and chubby; and the mother tells you with pride that cows' milk has been its food; but lurking within it [illegible] somewhere in the depths of its mesenteric glands, there is a focus of disease, infected perhaps long ago by some of its favourite milk, and slowly this disease caseates and spreads, until some day a neighbouring vein is encountered, its wall destroyed, and the virulent Bacilli are poured into its lumen, the blood stream carries the infection everywhere, and among others, to the Bones and Joints, and the pretty blue-eyed baby is now a cripple, maimed for life, and lucky to have escaped the deadly infection of tuberculous meningitis.

It/

It is not by any means an impossible picture; it occurs every day we live, and it is all the more ghastly when one realises that it is a remediable one, and there is nothing so hard as regret. Now I do not wish to expose an evil and suggest no alleviation of it, and I have ventured into the paths of what the kind will call oratory, in order to show that the condition is a remediable one.

Tuberculosis of cattle is a perfectly distinguishable disease, and one may divide tuberculous cattle into four classes. There is the cow in which the disease is as yet early and localised, situated probably in the lungs. Clinically there is no evidence of the infection, but the animal reacts to the Tuberculin Test. There is no elimination of Tubercle Bacilli in the milk.

In the second class I would group those animals which possess Tubercle Bacilli in their milk; which do not suffer from Tuberculosis of the udder, but from a tuberculous focus elsewhere.

The third class comprises those animals which obviously suffer from Tuberculosis of the udder, and of necessity are producing large quantities of Bacilli.

In/

In a fourth and final class I would dispose of those animals which are suffering from general Tuberculosis, and are prolific producers of infected milk. The second, third and fourth classes are those which are the standing danger to the community.

When Tubercle has been found to exist in the cow, by terms of the Act, the Local Authorities possess certain powers over these animals, but they are very limited, and in short they are a prevention of the milk from being sold or used as food for man, or, unless boiled, for the food of other animals. They possess no power to order the immediate slaughter of the animal. When an animal has been condemned, the owner occasionally destroys it; if he is a man of any conscience he always does, but quite frequently the cow is fattened and disposed of elsewhere.

The dairyman may dispose of his cow as a milk producer to another dairyman, and this latter individual is not compelled to notify the authorities that he is in possession of such a diseased animal. The Order I have quoted has been modified in its application to certain towns - a tuberculous cow detected within the radius of such must be removed beyond the city boundary within 24 hours -

there/

there it may be disposed of as the owner wishes; he may carry it into the next town if he pleases - "Robbing Peter to pay Paul". In 1903, the Burgh Police Act was vested with a clause which gave the Medical Officer power to control the milk supply coming from an infected dairy outside the Burgh Boundary.

These are the different precautions which may be taken, and at the least, how inadequate they are.

The weak point in legislation lies in the inability to order the slaughter of the infected animal. Now, of course, it would be an economical impossibility to suddenly order the destruction of all tuberculous cattle, therefore it is that I have sub-divided them into a number of classes. The scheme which I should propose is as follows:-

All cattle which are within Class 4 (General Tuberculosis), are to be destroyed whenever they are discovered, and the owner subsidised to the extent of one quarter of the animal's value.

Class No. 3 (Tuberculous Udders), must be destroyed within one year of the date of discovery, and during the interval between discovery and slaughter/

slaughter the milk is not to be used for any purpose whatsoever. When the animal is slaughtered, the owner is to be subsidised to the extent of one half of the valuation of the animal.

Class No. 2. The animal which is infected with tubercle, does not suffer from tuberculosis of the udder, and yet from time to time eliminates Tubercle Bacilli in the milk.

The milk from this animal must be boiled by the producer before it is sold, and it must be notified as such. Whenever the animal comes into line with Class 4 or Class 3, it will be dealt with accordingly.

Class No. 1. The animal which reacts to Tuberculin, and does not eliminate Tubercle Bacilli.

Such animals must be properly tested every three months, a centrifuged sample of the milk being inoculated into guinea-pigs, and should it fall into Classes 2, 3 or 4, to be dealt with accordingly.

This is the type of campaign which I would suggest. Certain things are obvious.

The only way to control this large possibility of infection is to entirely prevent the production of infected milk. The most certain way in which/

which to prevent this possibility is to slaughter the diseased animal whenever it is discovered. Now, an immediate slaughter of every diseased animal is out of the question, therefore there must be substituted for it a more gradual process of eliminating the evil. By the scheme which I have detailed, I believe it to be possible to almost immediately bring the whole system under control.

The success of any such scheme depends in its first instance upon a proper system of inspection, and it is this same system of inspection which is at present so grievously at fault. The table I have quoted, which shows that only 9% of the total milk cows are inspected, is an indication of the error, and in this same City of Edinburgh the conditions on a more local scale are just as bad. The total number of cows which supply milk to the inhabitants of Edinburgh amounts to 2800, and the complete inspection of a herd of this size is supposed to be undertaken by an inspector and his assistant. The thing is a glaring inadequacy and an impossibility.

I have in the preceding pages given some idea of the disasters which we are suffering from the ingestion by children of milk infected with the

Bovine/

Bovine Bacillus, and I hold that, by a proper system of Inspection, coupled with a revision of legislation such as I have outlined, it will be possible to entirely eradicate the evil.

CONCLUSIONS/

CONCLUSIONS.

A. It is possible to distinguish absolutely between Human and Bovine Tuberculosis.

B. The most satisfactory test in the differentiation of the organism is the inoculation of the rabbit with ·01 mgm. of Tubercle Bacilli, or the inoculation of the knee joint with a quantity of Bacillary Emulsion.

C. By the ingestion of cows' milk infected with the Bovine Bacillus, it is possible to infect human beings with Bovine Tuberculosis.

D. In children the occurrence of Bone and Joint Tubercle which is due to the Bovine Bacillus amounts to 60%.

E. The occurrence of Bone and Joint Tubercle which is due to the Human Bacillus amounts to 37%.

F. Those cases which are due to infection with the Human Bacillus are those which have become infected by residence in the house with a consumptive.

G./

G. In 3% of the cases of Bone and Joint Tubercle, both Bovine and Human Bacilli were present.

H. The occurrence of the enormous proportion of Bovine Tuberculosis is the inevitable result of an imperfect legislation, and a still more imperfect system of Dairy and Milk Inspection.

I. The Human element in the infection could be largely eliminated by the proper isolation of consumptives.

APPENDIX/

A P P E N D I X.

CONTAINING A DETAILED ACCOUNT OF THE SEPARATION OF THE ORGANISM IN 70 CASES OF BONE AND JOINT TUBERCULOSIS.

EXPERIMENT NO. 1.

H.M. $10\frac{11}{12}$ years.

HISTORY. Illness began seven months ago with pain in right hip and knee and the development of a limp in walking. No treatment was adopted; pain increased and an abscess developed; examination showed tuberculous disease of right hip joint.

FAMILY HISTORY. Father has pulmonary tuberculosis; mother and seven children are healthy.

PREVIOUS HISTORY. Breast fed; had measles, no other illness.

Admitted July 18th.

July 20th. The head of the femur was excised, and the hip joint found to be filled with synovial tubercle. The articular cartilages were exoded. There was some disease in the acetabulum.

July 21st. Portion of synovial membrane inoculated into animal.

PROGRESS OF ANIMAL.

Date.	Weight.	State.
July 21	1560 gms.	Inoculated.
Augt. 1	1500 gms.	-
Sept. 1	1400 gms.	-
Sept. 5	1200 gms.	-
Sept. 10	1280 gms.	Losing weight.
Sept. 20	1300 gms.	-
Sept. 30	1200 gms.	-
Octr. 5	1198 gms.	-
Octr. 10	1100 gms.	Rapidly losing weight.
Octr. 15	950 gms.	Killed & Examined.

POST/

POST MORTEM EXAMINATION. October 12th.

Left groin glands were tuberculous and caseating, also both axillary glands.

THORAX. Both lungs contained a number of small epitheliod tubercles. Peri-bronchial glands were healthy.

ABDOMEN. No evidence of tubercle in any of the abdominal organs.

October 12th. Cultures were made from the diseased glands upon egg medium. (Dorset).

December 1st. With one exception all the tubes inoculated showed a copious growth of tubercle.

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

The organism grew with unusual rapidity, and by its growth formed a piled-up and foliaceous mass upon the surface of the medium; it had a faint yellowish-pink colour, and a crinkled appearance. Characters in keeping with the Human Bacillus.

B. MORPHOLOGICAL CHARACTERS OF BACILLUS.

Bacilli are long - they stain equally and readily; there are no branching forms; stained with Much's Stain they show distinct nodular staining.. Characters in keeping with the Human Bacillus./

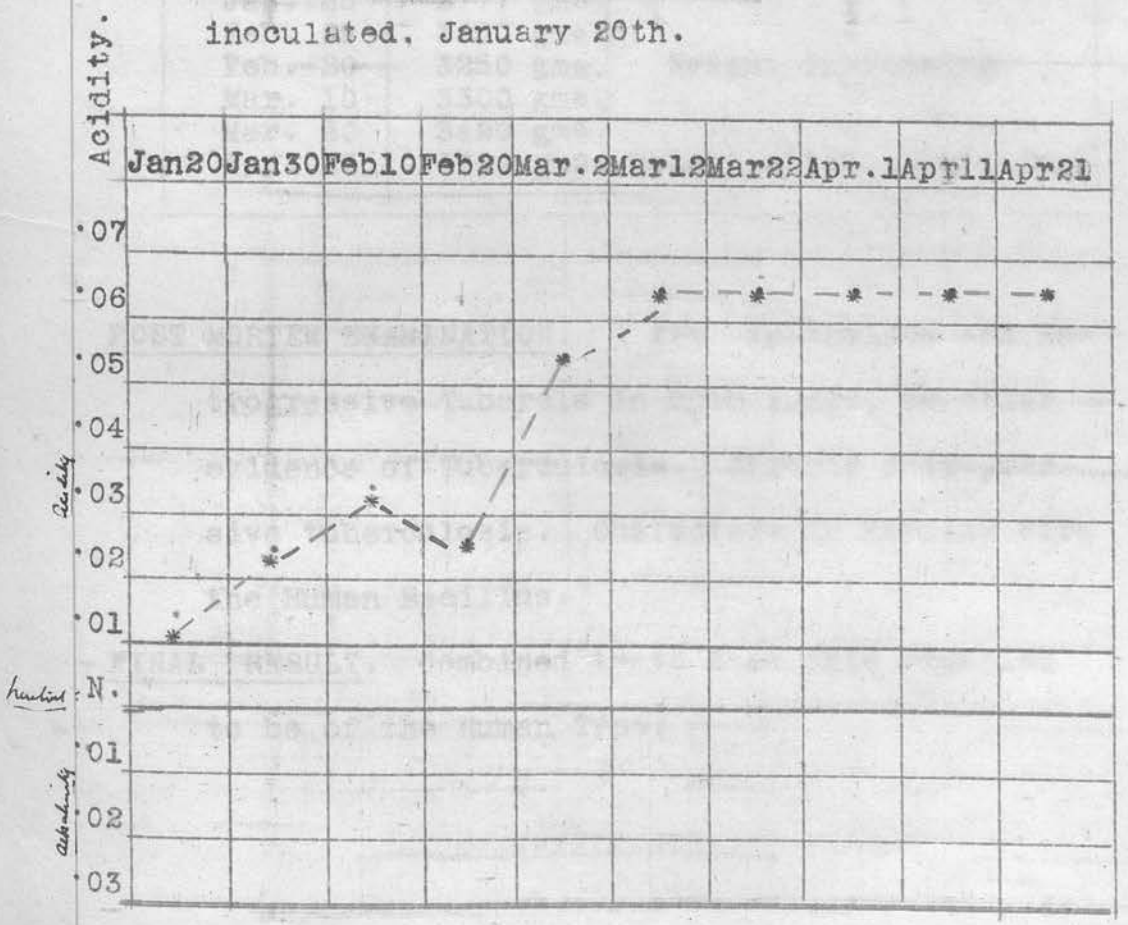
Bacillus.

C. SPECIAL CULTURAL REACTION.

At the end of 15 days a copious growth appeared upon the Glycerine Egg tubes and upon the control ordinary Egg tubes. The growth upon the Glycerine Egg tubes was the more prolific. Characters in keeping with Human Bacillus.

D. SMITH'S TEST.

Pasteur flask containing Glycerine Bouillon inoculated, January 20th.



Smith's/

Smith's test shows a steadily increasing rise in acidity, from ·01 to ·06 - the rise being suspended over a duration of four months. Characters in keeping with Human Bacillus.

E. INOCULATION TEST. January 18th, Rabbit inoculated with ·1 mgm. of Tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Jan. 18	2780 gms.	Inoculated.
Jan. 25	2777 gms.	-
Feb. 9	3050 gms.	-
Feb. 20	3250 gms.	Weight increasing.
Mar. 10	3300 gms.	-
Mar. 20	3420 gms.	-
Apr. 27	3700 gms.	Weight still increasing.

POST MORTEM EXAMINATION. A few Epithelioid and Retrogressive Tubercle in both lungs; no other evidence of Tuberculosis. Chronic retrogressive tuberculosis. Characters in keeping with the Human Bacillus.

FINAL RESULT. Combined tests shew this organism to be of the Human Type.

EXPERIMENT NO. 2.

A.T. $2\frac{1}{2}$ years.

HISTORY. Six months ago the patient developed Tuberculous disease of the right elbow joint. The joint was excised. Two months later pain was complained of in the left hip, and examination showed the condition to be one of Hip Joint Disease.

FAMILY HISTORY. Father and mother are healthy; patient's only brother died of Comsumption.

PREVIOUS HISTORY. Breast fed. Patient has been perfectly healthy until the present illness.

Admitted November 9th.

Operation November 10th. The head of the Femur was excised; there was found to be considerable disease of the synovial membrane, head of femur and acetabulum.

November 10th. Portions of scrapings from disease in acetabulum transplanted en masse into the flank of a guinea-pig.

PROGRESS/

PROGRESS OF ANIMAL.

Date.	Weight.	State.
Nov. 9	595 gms.	In statu quo.
Nov. 16	556 gms.	No change.
Nov. 24	504 gms.	No change.
Nov. 29	515 gms.	TB. tumour at Inoculation Wound; slightly enlarged gland in axilla.
Dec. 3	555 gms.	Distinct tumour; no change.
Dec. 4	549 gms.	No change.
Dec. 6	585 gms.	No change.
Dec. 8	571 gms.	Enlarged glands in left axilla.
Dec. 11	531 gms.	Glands increasing in size.
Dec. 17	601 gms.	Glands increasing in size.
Dec. 22	597 gms.	Glands larger; TB. mass in groin.
Jan. 3	584 gms.	Glands much larger; animal examined.

POST MORTEM EXAMINATION. General wasting; the groin and axillary glands are enlarged and caseating; sternal glands are diseased.

THORAX. Lungs are healthy; also the bronchial glands.

ABDOMEN. Liver contains a number of small tubercles. Spleen riddled with tubercles. Pancreas shows some caseation in its centre. The retroperitoneal and mesenteric glands are diseased.

Cultures were made upon Egg Medium, (Dorset), from the different lesions, more especially from the glands.

TESTS./

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

There was some difficulty in obtaining a primary growth; it began at a number of discrete points and these coalescing gave rise to a foliaceoua growth over the surface of the medium. Characters in keeping with Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

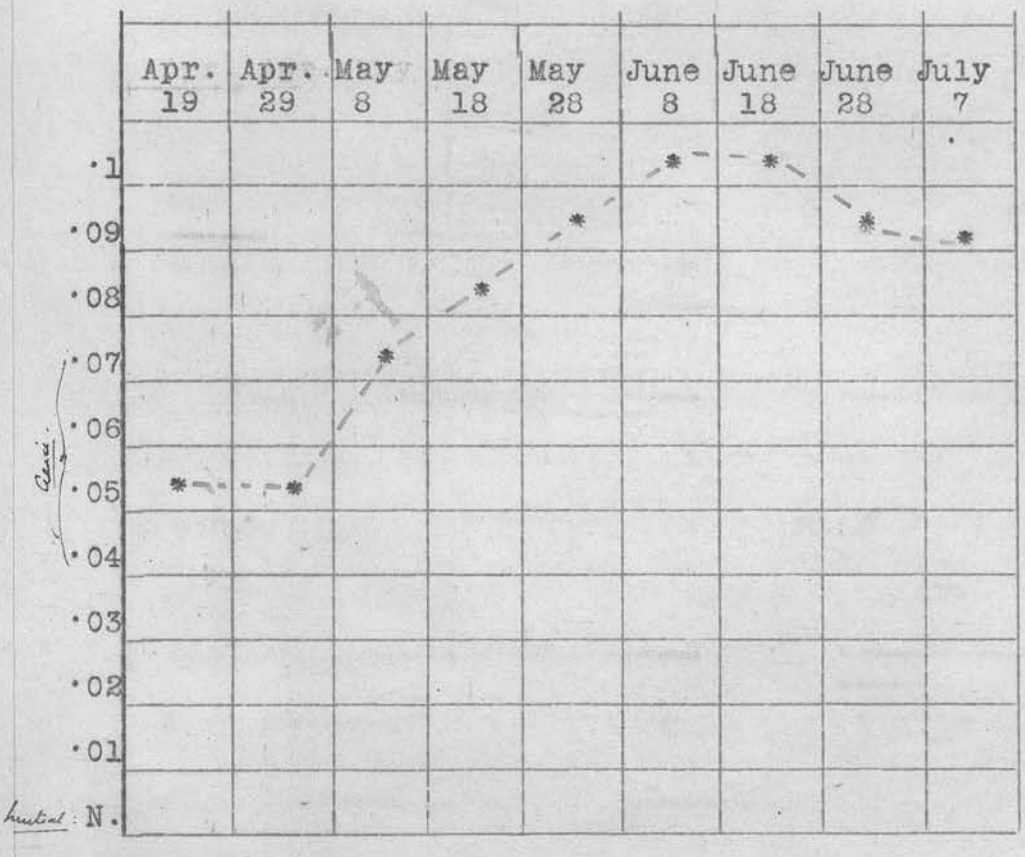
The organisms are small; some of them scarcely larger than cocci; they stain readily and show no sign of nodular staining. Characters in keeping with the Bovine Bacillus.

C. SPECIAL CULTURES.

One month after inoculation upon Glycerine Egg, a copious growth appeared. The growth upon the plain controls was less profuse. Characters in keeping with the Human Bacillus.

D./

D. SMITH'S TEST.



Smith's test shows a steadily increasing rise in acidity from ·05 to ·09. Characters in keeping with a Human Bacillus.

E. INOCULATION TEST. Rabbit inoculated with ·1 mgm. of Bacilli upon March 27th.

Date.	Weight.	State.
Mar. 27	3000 gms.	Inoculated.
Apr. 7	3007 gms.	-
Apr. 17	3050 gms.	-
Apr. 27	3070 gms.	Gaining weight.
May 5	3090 gms.	-
May 10	3100 gms.	-
May 15	3180 gms.	Still gaining weight.
May 20	3220 gms.	-
May 30	3300 gms.	Examined.

P.M. EXAMINATION. Abundant sub-cutaneous fat; no glandular involvement.

THORAX. There were several healing follicles in both lungs. In none of the other organs was there any evidence of Tubercle. A chronic retrogressive tuberculosis. Characters in keeping with the Human Bacillus.

FINAL RESULT. Tests show the organism to be of the Human type; the apparent indiscrepancy of the morphological characters depends upon the time which the organism took to grow; Tubercle Bacilli tend to shorten when their growth has been prolonged for any time.

EXPERIMENT NO. 3.

M.C. 6 years.

HISTORY. In December the child began to lose weight and flesh; four months later pain was complained of in the right hip, and the child became quite crippled. Conservative treatment was tried with no avail, and the child was admitted to Hospital.

FAMILY HISTORY. Father healthy. Mother once suffered from Tuberculosis. Three children, healthy except patient.

PREVIOUS/

PREVIOUS HISTORY. Breast fed until about one year old, and after that time had cow's milk. Measles when two years old. Upon November 17th an operation was performed, and the hip excised. there was considerable synovial tubercle, and some disease in the acetabulum.

November 17th. One guinea-pig inoculated subcutaneously with synovial membrane from this case.

PROGRESS.

Date.	Weight.	State.
Nov. 17	472 gms.	Operation.
Nov. 24	425 gms.	No change.
Nov. 29	455 gms.	Enlarged gland in left groin; Wound healing.
Dec. 3	484 gms.	Enlarged gland; No other changes.
Dec. 4	462 gms.	No change.
Dec. 6	465 gms.	No change.
Dec. 8	450 gms.	Enlarged gland very painful.
Dec. 11	468 gms.	No change.
Dec. 19	487 gms.	Glands enlarged; Still painful.
Dec. 21	506 gms.	Groin gland enlarged; Still painful.
Jan. 3	574 gms.	Glands smaller and weight increased.
Jan. 10	526 gms.	Killed and examined.

POST MORTEM EXAMINATION.

Superficial Glands-groin and axillary-are enlarged and tuberculous.

THORAX./

THORAX. Numerous small epithelioid follicles in both lungs; tubercles in the peri-bronchial glands.

ABDOMEN. Some scattered follicles in the Liver. Spleen enlarged and simply a mass of tubercles.

Numerous cultures were made upon Dorset's medium from all the available sources.

TESTS. A. ORIGINAL CULTURES.

The original cultures grew readily, and some of them showed the presence of foliaceous masses of a pale pink colour. Subcutaneous tubes grew exceedingly rapidly and profusely. Characters in keeping with the Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The Bacilli stain readily; they are long and thin, and most of them show distinct nodular staining. There are no branching or aberrant forms. Characters in keeping with a Human Bacillus.

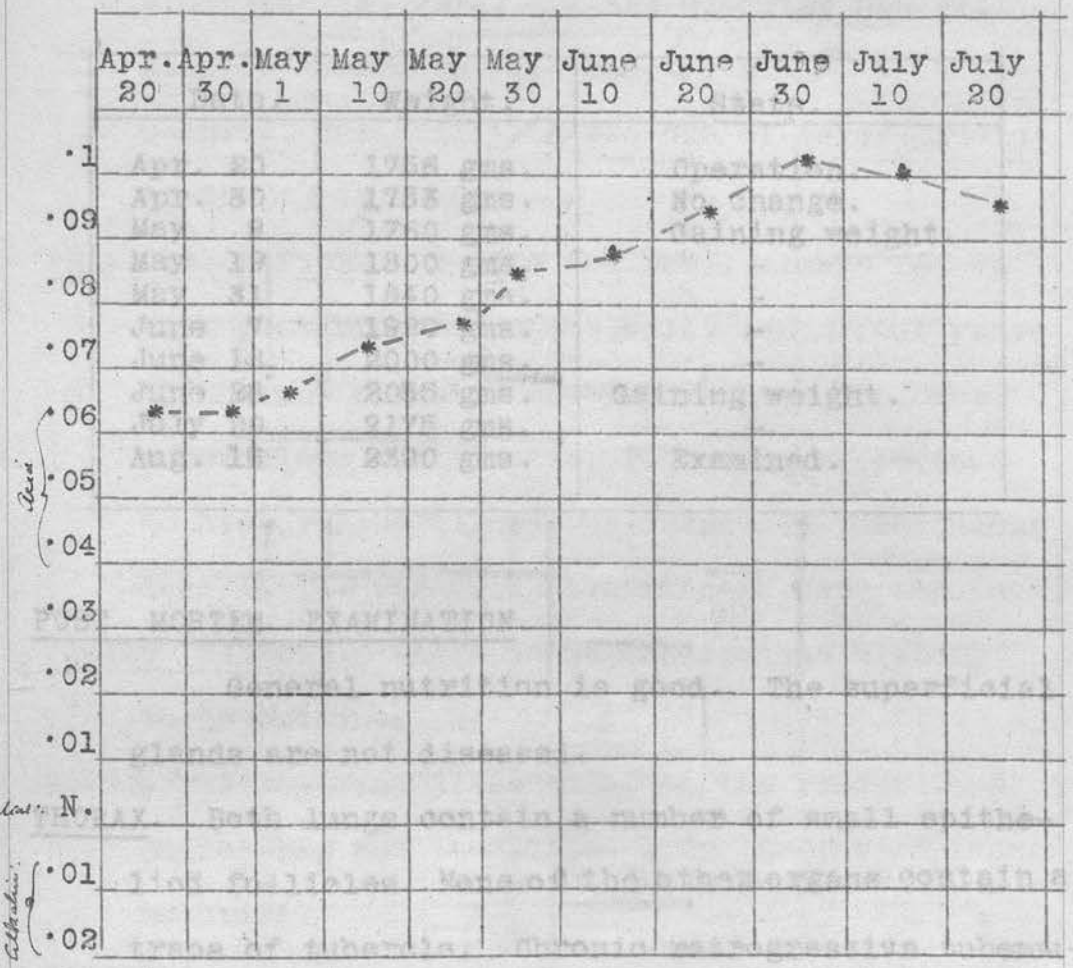
C. SPECIAL CULTURES.

In the course of three weeks a rapid and profuse growth appeared upon both the Glycerine Egg tubes and the control ordinary tubes. Characters in keeping with a Human Bacillus.

SMITH'S/

SMITH'S TEST.

Glycerine Bouillon flask inoculated upon April 20th.



Smith's test shows an increase of acidity from ·06 to ·1.

The characters are in keeping with those of the Human Bacillus.

E./

E. INOCULATION TEST.

Rabbit inoculated intravenously with ·1 mgm. of Culture upon April 20th.

PROGRESS OF RABBIT.

Date.	Weight.	State.
Apr. 20	1756 gms.	Operation.
Apr. 30	1753 gms.	No change.
May 9	1760 gms.	Gaining weight.
May 19	1800 gms.	-
May 31	1840 gms.	-
June 7	1920 gms.	-
June 18	2000 gms.	-
June 28	2055 gms.	Gaining weight.
July 20	2175 gms.	-
Aug. 16	2390 gms.	Examined.

POST MORTEM EXAMINATION.

General nutrition is good. The superficial glands are not diseased.

THORAX. Both lungs contain a number of small epithelioid follicles. None of the other organs contain a trace of tubercle. Chronic retrogressive tuberculosis. Characters in keeping with the Human Bacillus.

COMBINED RESULTS. The tests employed show this organism to be of the Human type.

EXPERIMENT/

EXPERIMENT NO. 4.

W.B. $7\frac{1}{12}$ years.

HISTORY. Illness began 5 months ago, when the left arm began to swell; and the swelling has gradually increased in size and the arm became painful; the condition was one of tuberculosis of the ulna.

PREVIOUS HISTORY. Bottle fed baby; always fed on milk just brought to the boil. When four years old he was operated on by Mr. Carmichael for tuberculous peritonitis; four months previous to his present illness he developed tuberculous dactylitis, for which two fingers were amputated.

FAMILY HISTORY. There is no tuberculous history to be obtained.

November 17th. The diseased ulna was removed. A guinea-pig was inoculated from the tuberculous material.

PROGRESS.

Date.	Weight.	State.
Nov. 17	387 gms.	Operation.
Nov. 24	415 gms.	No change.
Nov. 29	394 gms.	No apparent change.
Dec. 3	435 gms.	-
Dec. 4	436 gms.	No change.
Dec. 6	450 gms.	-
Dec. 8	445 gms.	-
Dec. 11	466 gms.	Enlarged glands in axilla.
Dec. 17	399 gms.	Glands quite marked.
Dec. 21	355 gms.	Glands enlarged all over; Cachexia obviously setting in.
Dec. 24	349 gms.	Examined.

Post/

POST MORTEM EXAMINATION.

The superficial glands are markedly involved with tubercle; both groin and axillary glands are affected.

THORAX. No tubercles in lungs; peri-bronchial glands are enlarged.

ABDOMEN. The liver is healthy. The spleen contains large numbers of tubercles. Involvement of the mesenteric glands. Tuberculosis of the portal glands and of the retroperitoneal glands. There is in fact an acute generalised tuberculosis.

Cultures were made from all the available sources upon ordinary Egg Medium (Dorset.)

TESTS. A. GENERAL APPEARANCE OF CULTURES.

There was considerable difficulty in getting this organism to grow. When it grew it did so in a diffuse manner, gradually spreading over the surface in a ground glass appearance; there was no suspicion of foliation or piling up. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

Short, squat Bacilli; they stain readily, but without any appearance of nodular staining; there are no aberrant forms. Characters in keeping with a Bovine Bacillus.

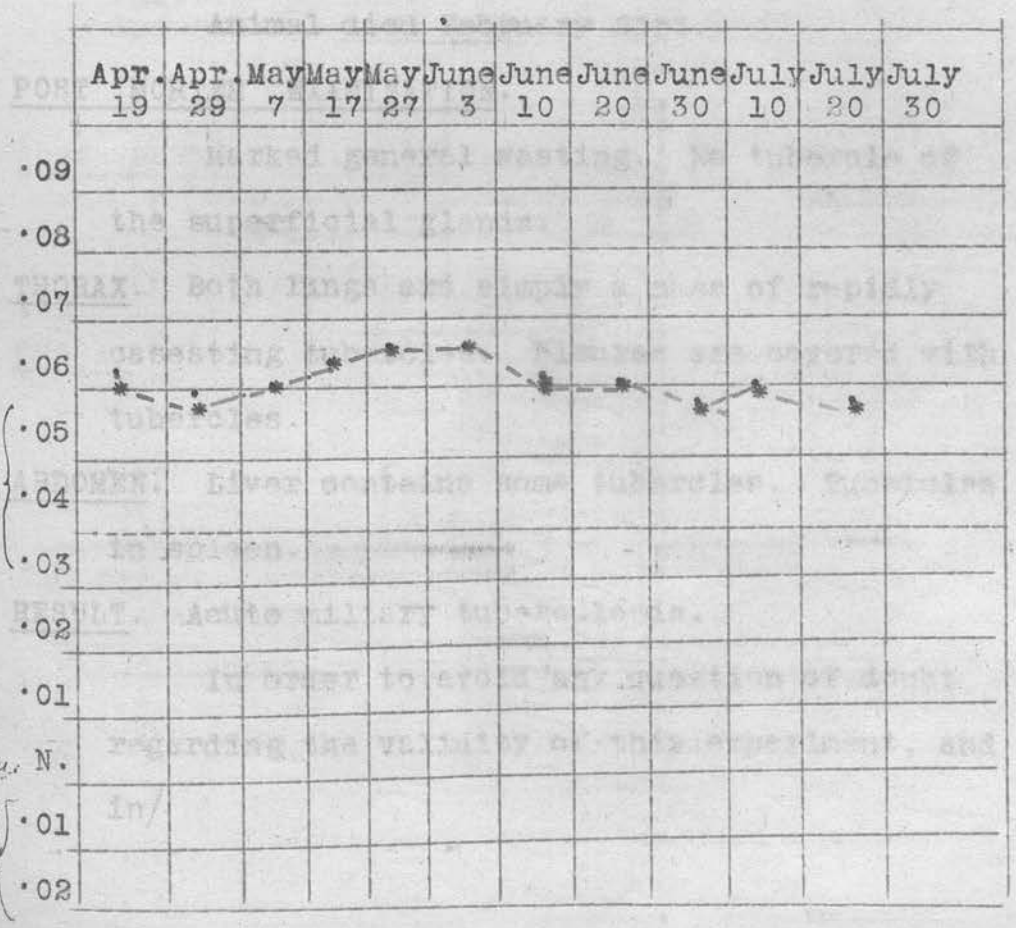
C./

C. SPECIAL CULTURAL REACTION.

The original culture was sub-cultured upon Glycerine Egg, and upon ordinary Egg tubes as controls. The result was an exceedingly sparse growth upon the Glycerine Medium, and a fair growth upon the ordinary Egg. Characters in keeping with a Bovine Bacillus.

D. SMITH'S TEST.

Glycerine Bouillon flask inoculated upon April 19th.



The/

The reaction remained almost constant; it did not show any increase of acidity, and while it is not typical, yet in its characters it resembles the reaction of the Bovine Bacillus.

Rabbit inoculated with ·1 mgm of Tubercle upon February 8th.

PROGRESS.

Date.	Weight.	State.
Feb. 8	1849 gms.	No change.
Feb. 15	1523 gms.	Wasting and cachexia.
Feb. 22	1028 gms.	Marked wasting.

Animal died February 23rd.

POST MORTEM EXAMINATION.

Marked general wasting. No tubercle of the superficial glands.

THORAX. Both lungs are simply a mass of rapidly caseating tubercles. Pleurae are covered with tubercles.

ABDOMEN. Liver contains some tubercles. Tubercles in spleen.

RESULT. Acute miliary tuberculosis.

In order to avoid any question of doubt regarding the validity of this experiment, and in/

in keeping with the most recent Commission results, a second inoculation experiment was carried out, using ·01 mgm. instead of ·1 mgm.

Rabbit inoculated with ·01 mgm. of Tubercle from W.B.

PROGRESS.

Date.	Weight.	State.
Mar. 23	1350 gms.	Inoculated.
Mar. 30	1300 gms.	-
Apr. 7	1220 gms.	-
Apr. 17	1180 gms.	Losing weight.
Apr. 20	1100 gms.	-
Apr. 30	1000 gms.	Died.

POST MORTEM EXAMINATION.

Great general wasting. No involvement of the superficial glands.

THORAX. Both lungs are simply packed with caseating tubercles.

ABDOMEN. Liver and spleen riddled with tubercles.

Tubercles on both kidneys. Acute disseminated tuberculosis.

Combined results show that the organism in this case is of the Bovine type.

EXPERIMENT/

EXPERIMENT NO. 5.

J.R. 7 years.

HISTORY. Complained of pain in knee joint nine weeks before admission. Swelling gradually appeared, with all the usual accompaniments of tuberculous disease. The child was admitted to Hospital.

PREVIOUS HISTORY. Bottle fed baby, milk unboiled. No other illness.

FAMILY HISTORY. Father and mother are healthy. History of Syphilis, no history of Tubercle.

The knee joint was excised. There was found to be pure synovial tubercle, with no disease of the bone. Some of the diseased synovial membrane was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 1	458 gms.	Operation.
Dec. 3	427 gms.	-
Dec. 4	445 gms.	No change.
Dec. 6	459 gms.	Wound healed.
Dec. 8	442 gms.	Large TB. mass of Glands. in left groin.
Dec. 11	419 gms.	-
Dec. 17	468 gms.	-
Dec. 22	498 gms.	-
Jan. 3	350 gms.	Weight enormously diminished.
Jan. 9	354 gms.	-
Jan. 20	370 gms.	Killed.

POST/

POST MORTEM EXAMINATION.

Considerable general wasting; a tuberculous tumour at the site of inoculation. The groin glands upon both sides were tuberculous. The axillary glands were healthy.

THORAX. Both lungs were riddled with tubercles, most of these rapidly caseating. The bronchial glands were tuberculous.

ABDOMEN. Tubercles in liver and spleen. Retroperitoneal glands were tuberculous; an acute disseminated tuberculosis.

Cultures were made from all the possible sources, and a growth obtained at about the end of four weeks.

TESTS. A. GENERAL APPEARANCE OF ORIGINAL CULTURE.

The organism grew slowly and when it did so, it was in the form of a diffuse ground glass appearance, spreading over the surface of the medium. No tendency to piling up. Dry and rather difficult to disassociate. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

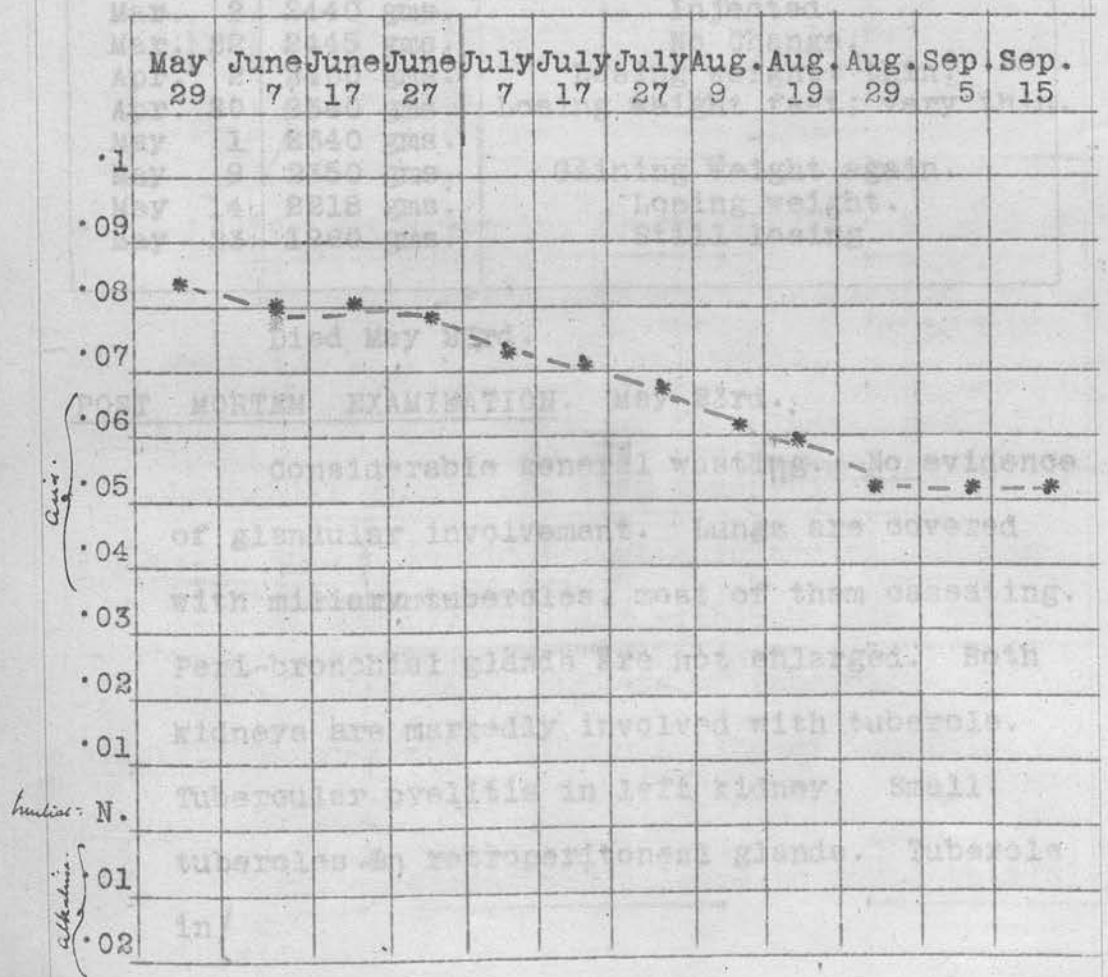
Very short Bacilli; stains readily; no sign of nodular staining; no branching or aberrant forms. Characters in keeping with a Bovine Bacillus./

Bacillus.

C. SPECIAL CULTURE TEST.

The subculture upon Glycerine Egg grew languidly and imperfectly; the control cultures upon ordinary Egg certainly grew more luxuriantly. Characters in keeping with a Bovine Bacillus.

D. SMITH'S TEST.



The/

The Glycerine Bouillon showed a steady decrease in acidity from ·09 to ·05. Characters in keeping with a Bovine Bacillus.

INOCULATION TEST. March 2nd. One rabbit inoculated with ·1 mgm. of Bacilli.

PROGRESS OF RABBIT.

Date.	Weight.	State.
Mar. 2	2440 gms.	Injected.
Mar. 22	2445 gms.	No Change.
Apr. 2	2400 gms.	Losing weight; thin.
Apr. 20	2340 gms.	Losing weight fast; very thin.
May 1	2340 gms.	-
May 9	2350 gms.	Gaining weight again.
May 14	2218 gms.	Losing weight.
May 23	1960 gms.	Still losing.

Died May 23rd.

POST MORTEM EXAMINATION. May 23rd.

Considerable general wasting. No evidence of glandular involvement. Lungs are covered with miliary tubercles, most of them caseating. Peri-bronchial glands are not enlarged. Both kidneys are markedly involved with tubercle. Tubercular pyelitis in left kidney. Small tubercles in retroperitoneal glands. Tubercle in/

in both testes. Patch of tubercle ? in peritoneum on left side. Tubercles in spleen.

RESULT. General disseminated Tuberculosis.

RESULT. Bovine Tuberculosis.

CONFIRMATORY INOCULATION EXPERIMENT.

Rabbit inoculated with ·01 mgm. of Tubercle.

PROGRESS.

Date.	Weight.	State.
Oct. 20	2200 gms.	Operation.
Nov. 4	2000 gms.	-
Nov. 10	1920 gms.	-
Nov. 13	1900 gms.	Died.

POST MORTEM EXAMINATION. November 13th.

General wasting, as shown by loss in weight. No glandular involvement.

THORAX. Marked involvement of both lungs; peribronchial glands are also involved.

ABDOMEN. Spleen is riddled with tubercles. Liver is also greatly involved with tubercle. Both kidneys show large numbers of tubercles.

RESULT. General acute dissemination of tubercle.

RESULT. Bovine.

The continued tests leave no doubt that this/

this Bacillus is of the Bovine type.

EXPERIMENT NO. 6.

B.P. $3\frac{1}{2}$ years.

HISTORY. Six months ago pain was complained of in the right elbow joint; a swelling gradually appeared; the arm was put in splints, and kept so for some months. She did not improve, and was therefore admitted to Hospital.

FAMILY HISTORY. No history of tubercle in family; three children, all well.

PREVIOUS HISTORY. Breast fed until one year old. Some diseased bone was removed from the right foot nine months ago. The joint was excised upon September 6th, there was found to be considerable synovial tubercle, and a focus of disease in the lower metaphysis of the Humerus.

Animal inoculated with some tuberculous material from the synovial membrane.

PROGRESS.

Date.	Weight.	State.
Sep. 19	2560 gms.	Recovered from Operation.
Sep. 25	-	-
Oct. 2	-	-
Oct. 20	-	-
Nov. 5	-	-
Nov. 12	-	-
Nov. 20	-	-
Nov. 30	-	-
Dec. 7	1950 gms.	Animal killed.

POST MORTEM EXAMINATION.

There was some tuberculous disease in the left groin gland. At the site of inoculation there was a mass of caseating tubercle.

THORAX. Both lungs contained a number of tubercles, most of them epithelioid in type. The abdominal organs were all healthy.

Cultures were made from all the available sources.

TESTS. A. GENERAL APPEARANCE OF CULTURES.

The original cultures grew without much trouble; they extended diffusely over the surface of the medium in a ground glass appearance. There is no tendency towards piling up of the medium. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The organisms are all short and squat in appearance; they do not all stain readily. None of them show any trace of nodular staining. There are no aberrant forms. Characters in keeping with a Bovine Bacillus.

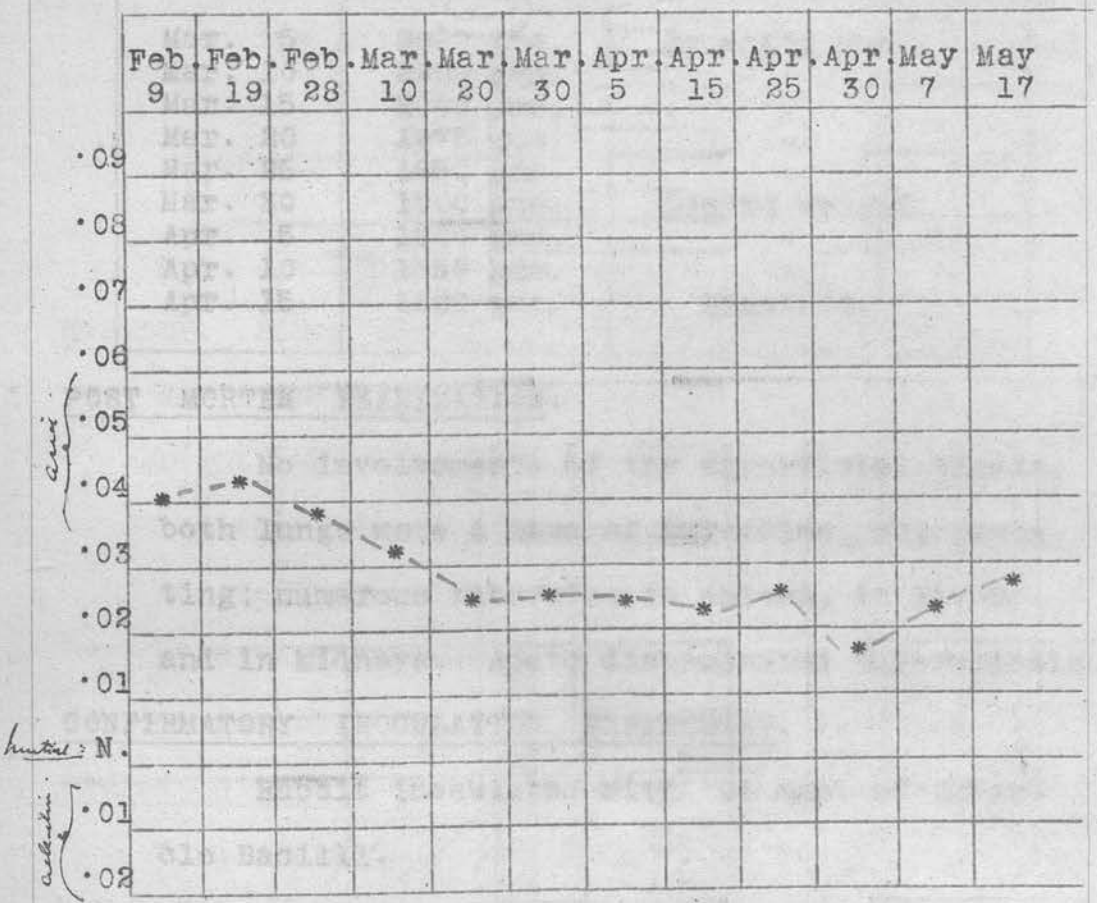
C. SPECIAL CULTURE TESTS.

Cultures were made upon Glycerine Egg tubes and upon control tubes of ordinary Egg.

In/

In both tubes there was a considerable growth. No special importance can be attached to this test, as the third sub-culture was employed in the test.

D. SMITH'S TEST.



Inoculation of a Glycerine Bouillon flask produces a steady fall in acidity from ·04 to ·02. Characters in keeping with a Bovine Bacillus./

Bacillus.

INOCULATION TEST. Rabbit inoculated with ·1 mgm of tubercle upon March 5th.

PROGRESS.

Date.	Weight.	State.
Mar. 5	2090 gms.	In statu quo.
Mar. 10	2000 gms.	-
Mar. 15	2000 gms.	-
Mar. 20	1975 gms.	-
Mar. 25	1950 gms.	-
Mar. 30	1900 gms.	Losing weight.
Apr. 5	1900 gms.	-
Apr. 10	1850 gms.	-
Apr. 15	1820 gms.	Examined.

POST MORTEM EXAMINATION.

No involvements of the superficial glands; both lungs were a mass of tubercles, all caseating; numerous tubercles in spleen, in liver and in kidneys. Acute disseminated Tuberculosis.

CONFIRMATORY INOCULATION EXPERIMENT.

Rabbit inoculated with ·01 mgm. of tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Oct. 6	2050 gms.	Operation.
Nov. 4	1900 gms.	-
Nov. 14	1750 gms.	Losing weight.
Nov. 21	1700 gms.	-

November/

November 22nd, animal died.

POST MORTEM EXAMINATION. THORAX. Both lungs were solid with acute caseating tubercles.

ABDOMEN. Liver, spleen and both kidneys infiltrated with rapidly caseating tubercles. Acute disseminated tuberculosis. Combined tests show that the Bacillus in this case is Bovine in type.

EXPERIMENT NO. 7.

M.L. $7\frac{3}{12}$ years.

HISTORY. Since the child was two years old, pain and stiffness had been complained of in the right knee; the part became swollen from time to time. Six months ago, the pain became more constant and acute, and a plaster case was applied. There was no benefit, in fact the pain increased. She was then admitted to Hospital.

FAMILY HISTORY. Father had syphilis; mother well; family are four, one died of congenital syphilis.

PREVIOUS HISTORY. Bottle fed baby; no other illness previous to this one. December 20th - an operation was performed, and the knee joint excised./

excised; some of the diseased synovial membrane was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 20	270 gms.	Operation.
Dec. 22	272 gms.	In statu quo.
Jan. 3	315 gms.	No change; thickened tumour at seat of inoculation.
Jan. 9	295 gms.	Tumour enlarged; Glands?
Jan. 20	200 gms.	Died suddenly.

POST MORTEM EXAMINATION.

There was considerable disease in all the superficial glands.

THORAX. Both lungs contained a number of follicles, most of them caseating; peri-bronchial glands were healthy.

ABDOMEN. Spleen and liver contained numerous tubercles. The portal glands and the retroperitoneal glands were tuberculous and caseating.

Cultures were made from all the possible sources.

TESTS. A. GENERAL APPEARANCE OF CULTURES.

The original growth was slow and difficult; sub-cultures grew a little more freely.

The/

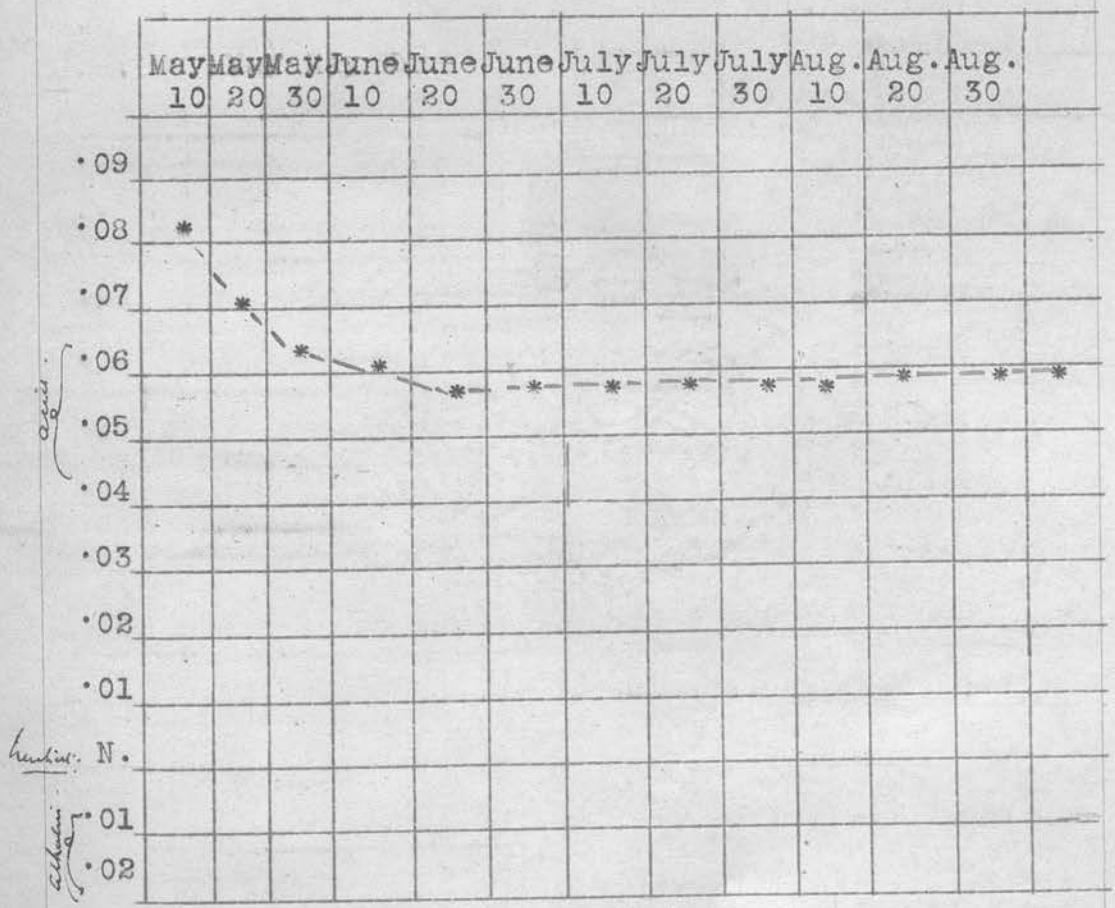
The organism spread over the surface of the medium in a fine granular growth, very adherent and difficult to disintegrate. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

Numerous short Bacilli; quite uniform; stain readily; there is no trace of nodular staining; no bronchial or aberrant forms. Characters in keeping with a Bovine Bacillus.

C. The organism, when sub-cultured upon Glycerine tubes, was somewhat retarded in its growth. Characters in keeping with a Bovine Bacillus.

D. SMITH'S TEST.



The/

The Glycerine Medium showed a steady fall in acidity from ·08 to ·05. Characters in keeping with a Bovine Bacillus.

E. INOCULATION TEST.

March 3rd. One rabbit inoculated with ·1 mgm. of Culture Emulsion.

PROGRESS OF RABBIT.

Date.	Weight.	State.
Mar. 3	2348 gms.	Injected.
Mar. 7	1969 gms.	Losing Weight.
Mar. 10	1546 gms.	Still Losing.
Mar. 13	1227 gms.	-

Animal died March 15th.

POST MORTEM EXAMINATION.

Marked general wasting. No enlarged superficial glands.

THORAX. Both lungs are simply a solid mass of tubercle. There are a number of tuberculous follicles scattered over the pleurae.

ABDOMEN. Some points of tubercle in the liver and spleen.

RESULT. Even at this early stage, i.e., 12 days, there is an acute dissemination of tubercle.

Characters/

Characters in keeping with a Bovine Bacillus.

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated upon October 10th, with ·01 mgm. of Tubercle.

PROGRESS.

Date.	Weight.	State.
Oct. 10	2000 gms.	Operation.
Nov. 4	1900 gms.	-
Nov. 10	1800 gms.	-
Nov. 14	1700 gms.	Animal died.

POST MORTEM EXAMINATION. November 14th.

Marked general wasting. No evidence of superficial glandular involvement.

THORAX. Both lungs were simply solid with tubercle, the nodules being quite diffuse and caseating. The peri-bronchial glands were early involved.

ABDOMEN. Both kidneys were more markedly involved than I have ever noticed before. They were simply riddled with large caseating nodules.

Spleen showed a number of small tubercles.

Liver - no sign of tubercle.

RESULT. Marked general dissemination of Tubercle.

RESULT. Bovine.

EXPERIMENT NO. 8.

M.C. 10 years.

HISTORY. Patient, a boy aged 10 years was said to have hurt his toe three months ago. A swelling gradually appeared, and an abscess formed, which burst, leaving a sinus leading into metatarsal.

FAMILY HISTORY. Mother had Phthisis. Father well. No other children.

PREVIOUS HISTORY. Breast fed child; measles and whooping-cough; no other ailment.

January 7th. The metatarsal bone was resected sub-periosteally; there was a focus of disease in its distal extremity.

A guinea-pig was inoculated in the left flank with a portion of the disease.

PROGRESS.

Date.	Weight.	State.
Jan. 7	408 gms.	Operation.
Jan. 9	384 gms.	-
Jan. 20	416 gms.	Large TB. tumour; no palpable glands.
Jan. 25	423 gms.	Tumour smaller; glands appearing.
Feb. 1	435 gms.	Glands show no change.
Feb. 8	425 gms.	Glands & loss of weight.
Feb. 14	385 gms.	Commencing cachexia and loss of weight.

Animal/

Animal died February 22nd.

POST MORTEM EXAMINATION.

The groin and axillary glands are enlarged and caseating.

THORAX. Both lungs contain a number of rapidly caseating tubercles. The peribronchial glands are also tuberculous.

ABDOMEN. Liver and spleen contain quite a number of caseating tubercles; the retroperitoneal glands are tuberculous.

Cultures were made from all the possible available sources.

A. GENERAL APPEARANCE OF CULTURES.

The organism grew easily and rapidly, forming at first discrete colonies of a rounded and piled up appearance, afterwards running together to form a crinkled foliaceous mass. Characters in keeping with a Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

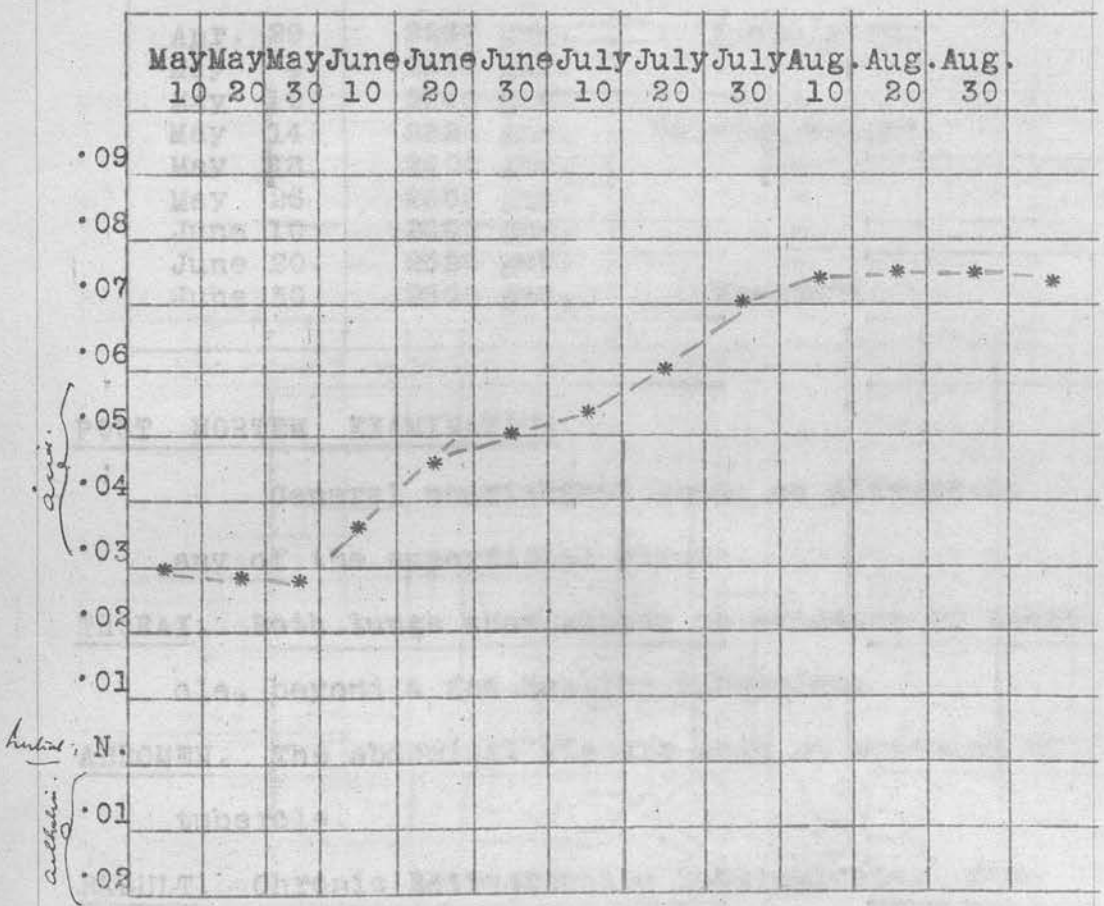
Bacilli were short on the average; they stained readily; no nodular staining; no branched or aberrant forms. Characters in keeping with the Bovine Bacillus, but as the examination was made from a sub-culture it must not/

not be relied upon.

C. SPECIAL CULTURE TEST.

The Glycerine Egg tubes inoculated grew more profusely than the ordinary Egg tubes. Characters in keeping with the Human Bacillus.

D. SMITH'S TEST.



The inoculation of the medium with the Bacillus produced a progressive increase in acidity./

acidity. Characters in keeping with the Human Bacillus.

E. INOCULATION TEST. Rabbit inoculated upon April 29th with ·1 mgm. of Tubercle.

PROGRESS.

Date.	Weight.	State.
Apr. 29	2237 gms.	Inoculated.
May 4	2230 gms.	-
May 10	2240 gms.	-
May 14	2320 gms.	Gaining weight.
May 18	2400 gms.	-
May 26	2500 gms.	-
June 10	2500 gms.	-
June 20	2520 gms.	-
June 30	2500 gms.	Examined.

POST MORTEM EXAMINATION.

General nourishment good; no disease in any of the superficial glands.

THORAX. Both lungs show almost no evidence of tubercle, beyond a few healing tubercles.

ABDOMEN. The abdominal viscera show no evidence of tubercle.

RESULT. Chronic Retrogressive Tuberculosis. Combined results show that in this case the organism is Human in type.

EXPERIMENT/

EXPERIMENT NO. 19.

J.F. $\frac{11}{12}$ years.

HISTORY. Four weeks ago it was noticed that there was some swelling of the left leg, about the centre of the tibia; it gave rise to some pain and discomfort, and the child began to lose weight and flesh.

PREVIOUS HISTORY. Breast fed; during the day, however, it is put into a day nursery, where it gets ordinary milk.

FAMILY HISTORY. Father and mother are healthy. Two other children have suffered from running ears.

January 10th. The middle third of the left tibia was resected, and a portion of the diseased bone (Tuberculous Osteomyelitis), inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Jan. 10	556 gms.	Inoculated.
Jan. 20	486 gms.	-
Jan. 30	493 gms.	-
Feb. 8	450 gms.	Losing weight.
Feb. 14	428 gms.	-
Mar. 1	420 gms.	-
Mar. 9	400 gms.	Examined.

POST/

POST MORTEM EXAMINATION.

The hip and groin glands were enlarged and caseating.

THORAX. Both lungs contained a number of small caseating tubercles.

ABDOMEN. Tubercles in spleen, also in liver. Retro-peritoneal glands were tuberculous.

Cultures were made from the available material.

TESTS. A. APPEARANCE OF ORIGINAL CULTURES.

The organism grew slowly and with difficulty; it spread gradually over the surface of the medium. There was no tendency towards piling up of the growth. Characters in keeping with the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

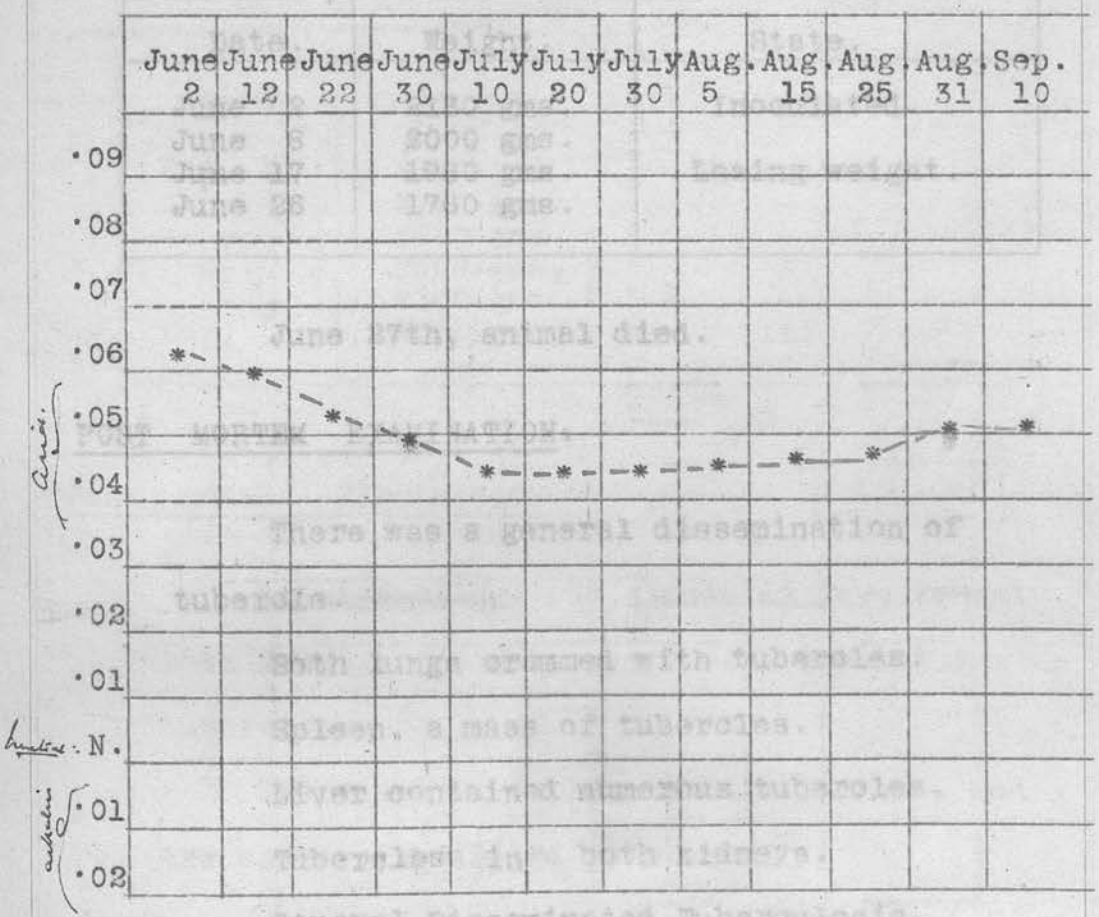
Numerous short Bacilli; here and there there are longer forms. There are no aberrant forms. Characters in keeping with a Bovine Bacillus.

C. SPECIAL CULTURE.

The inoculation of Glycerine medium with the organism produces a very indifferent growth/

growth, obviously the presence of Glycerine rather retards the growth. Characters in keeping with a Bovine Bacillus.

D. SMITH'S TEST.



Inoculation of the Glycerine Bouillon showed a steady fall in acidity from ·065 to ·04. Characters in keeping with a Bovine Bacillus.

INOCULATION/

INOCULATION TEST.

June 2nd. One rabbit inoculated with ·1 mgm. of Emulsion of Tubercle Bacilli.

PROGRESS OF RABBIT.

Date.	Weight.	State.
June 2	2130 gms.	Inoculated.
June 8	2000 gms.	
June 17	1980 gms.	Losing weight.
June 26	1760 gms.	

June 27th, animal died.

POST MORTEM EXAMINATION.

There was a general dissemination of tubercle.

Both lungs crammed with tubercles.

Spleen, a mass of tubercles.

Liver contained numerous tubercles.

Tubercles in both kidneys.

General Disseminated Tuberculosis.

RESULT. Bovine Tubercle.

CONFIRMATORY./

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Oct. 10	2700 gms.	Operation.
-	2750 gms.	-
-	2700 gms.	-
-	2500 gms.	-
-	2300 gms.	-
Nov. 1	2000 gms.	Died.

POST MORTEM EXAMINATION.

Great wasting. No glandular involvement. Both lungs are simply solid with caseating tubercles.

There are tubercles in both kidneys, and the spleen is riddled with them.

RESULT. Acute Disseminated Tuberculosis.

Combined tests show that the organism in this case was Bovine in character.

EXPERIMENT NO. 10.

D. D. 5 years.

HISTORY. 12 months ago the mother noticed that the right knee was swollen and painful when handled. The limb was put in plaster for three months and the case was repeated at that interval during the year. Condition has not improved.

PREVIOUS HISTORY. Bottle fed since birth; no precaution taken with milk; had tubercular mesenteric glands when 16 months old.

FAMILY HISTORY. Father died of phthisis; Mother died in childbirth; no other children.

January 26th the child had the knee joint excised; there was synovial tubercle and no trace of disease in the bone.

A guinea-pig was inoculated with some of the diseased membrane.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Jan. 26	560 gms.	Operation.
Feb. 1	557 gms.	No change.
Feb. 8	552 gms.	No change.
Feb. 16	572 gms.	No change.
Mar. 1	562 gms.	Beginning to lose weight.
Mar. 9	457 gms.	Losing fast - killed.

POST/

POST MORTEM EXAMINATION. The groin glands upon both sides were enlarged and tuberculous. The left axillary glands were also caseating.

THORAX. Both lungs contained a number of tubercles. The peribronchial glands were healthy.

ABDOMEN. Spleen is enlarged and tuberculous: liver contains a number of scattered tubercles. The retroperitoneal glands are tuberculous.

Cultures were made from all the available sources upon Egg Medium (Dorset's).

TESTS.

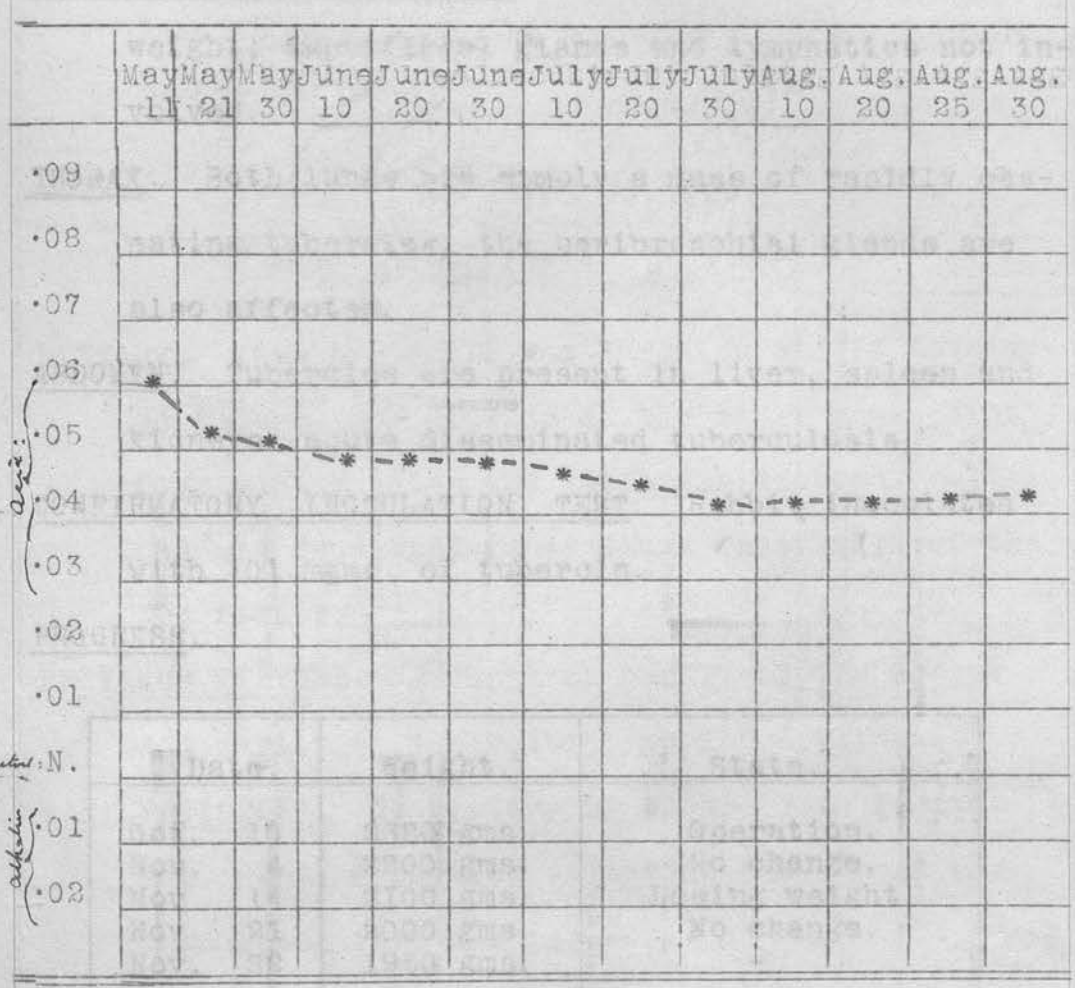
A. APPEARANCE OF ORIGINAL CULTURE. The organism was difficult to grow, and at no time was its growth in any degree profuse. The organism grew in a ground glass: appearance over the surface of the medium; characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS. Short bacilli; stain equally and readily; no branching or aberrant forms; characters in keeping with a Bovine Bacillus.

C. SPECIAL CULTURE. Cultures made upon Glycerine Media grew more feebly than the control tubes upon ordinary media; characters in keeping with the Bovine Bacillus.

D/

D. SMITH'S TEST.



Inoculation of the Glycerine Bouillon resulted in a steady drop in acidity from ·06 to ·04. Characters in keeping with the Bovine Bacillus.

E. INOCULATION TEST. Rabbit inoculated; 3 ·1 mgm.

Date.	Weight.	State.
May 12	2060 gms.	Operation.
May 17	2000 gms.	
May 20	2000 gms.	Loss of weight
May 25	1900 gms.	is
May 27	1800 gms.	progressive.
May 29	1762 gms.	

Animal died May 29th.

POST MORTEM EXAMINATION. Great loss of flesh and weight; superficial glands and lymphatics not involved.

THORAX. Both lungs are simply a mass of rapidly caseating tubercles; the peribronchial glands are also affected.

ABDOMEN. Tubercles are present in liver, spleen and kidneys: acute disseminated tuberculosis.

CONFIRMATORY INOCULATION TEST. Rabbit inoculated with ·01 mgms. of tubercle.

PROGRESS.

Date.	Weight.	State.
Oct. 10	2320 gms.	Operation.
Nov. 4	2200 gms.	No change.
Nov 14	2100 gms.	Losing weight.
Nov 21	2000 gms.	No change.
Nov. 22	1950 gms.	-

Animal killed November 22nd.

POST MORTEM EXAMINATION. Loss in weight as shown in weight chart.

THORAX. Both lungs are simply riddled with tubercles rapidly caseating: peribronchial glands.

ABDOMEN. Liver contains tubercles: spleen riddled with tubercles: both kidneys riddled with caseating tubercles.

Result/

Result acute disseminated tubercle.

Results show that the organism in this case is Bovine in type.

EXPERIMENT NO. 11.

J.F.G. $1\frac{7}{12}$ years.

HISTORY. When the child was 7 months old it developed tuberculous disease of the right knee joint; four months later the joint was excised. It had now developed Tuberculous Dactylitis of the 3rd finger.

PREVIOUS HISTORY. Brought up partly on the breast and partly on the bottle; no other illness.

FAMILY HISTORY. No history of tubercle in family.

Feb. 22nd. a portion of the diseased bone was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Feb. 22	230 gms.	Operation.
Mar. 1	232 gms.	No change.
Mar. 9	277 gms.	No change.
Mar. 27	291 gms.	Gaining weight yet glands are enlarged.

Animal killed April 17th.

POST/

POST MORTEM EXAMINATION. General wasting: curious enlargement and affection of all the glands; they all being tuberculous and caseous, groin and axillary.

THE SPLEEN is enlarged and full of miliary tubercles.

There are a number of tubercles in the liver; some of them early epithelioid and others distinctly caseous in character.

Cultures were made from the affected glands and from the spleen.

TESTS.

A. APPEARANCE OF ORIGINAL CULTURE. The organism was difficult to grow and when it did grow it was without any trace of profuseness; spreading rather over the surface in a diffuse ground glass appearance: no trace of any piling up of the growth. Characters in keeping with a Bovine Bacillus.

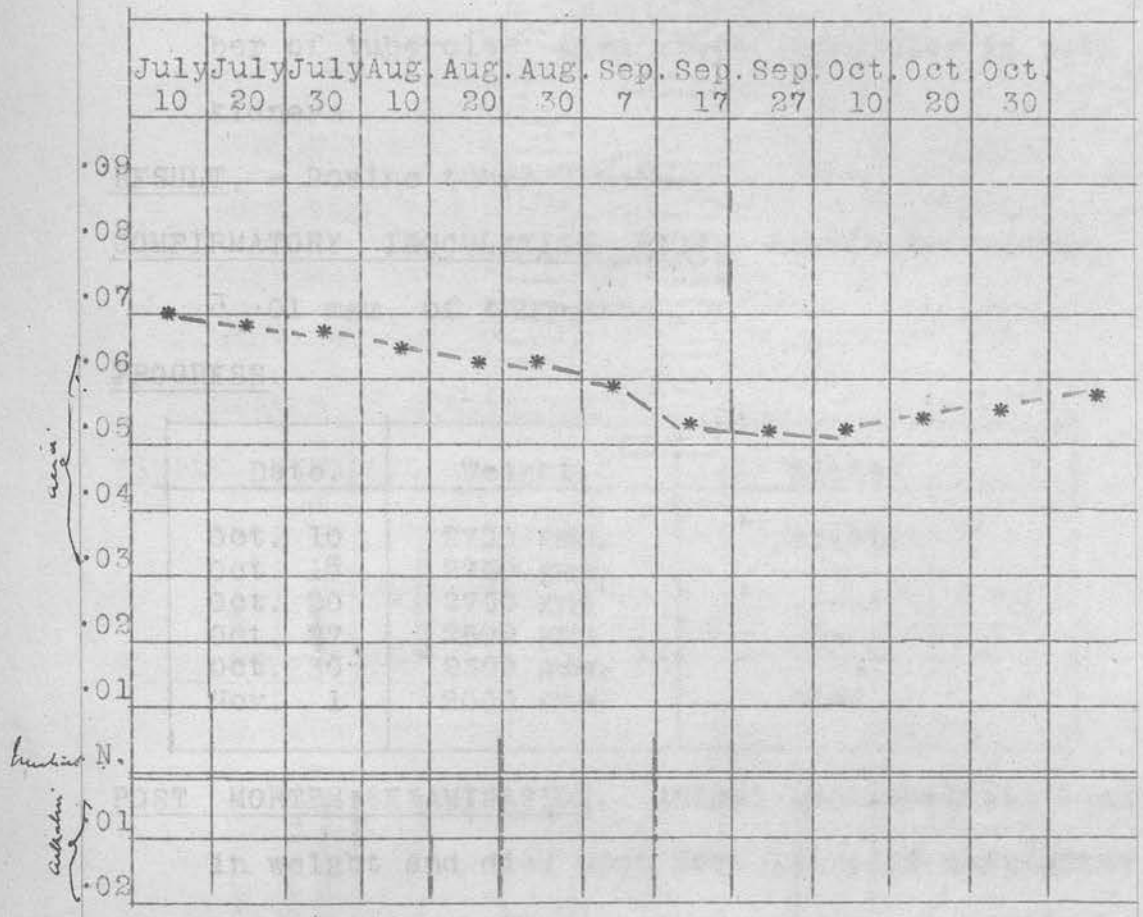
B. MORPHOLOGICAL CHARACTERS. Short bacilli: here and there some longer forms; but the majority are short: no aberrant varieties.

C. SPECIAL CULTURE TEST. The growth upon Glycerine Egg grows much less readily than that upon ordinary Egg. The growth is a scanty one.

Characters of the Bovine Bacillus.

D/

D. SMITH'S TEST.



Inoculation of the Glycerine Medium showed a progressive fall in acidity from ·07 to ·05.

INOCULATION TEST. Rabbit inoculated Jan. 2nd with ·1 mgm. of tubercle.

PROGRESS.

Date.	Weight.	State.
June 2	2130 gms.	Inoculated ō ·1 mgm.
June 8	2000 gms.	Losing weight.
June 17	1980 gms.	
June 26	1760 gms.	

Animal died June 27th.

POST/

POST MORTEM EXAMINATION. General dissemination of tubercle: both lungs are riddled: spleen - number of tubercles: also liver: tubercles in both kidneys.

RESULT, - Bovine tuberculosis.

COMFIRMATORY INOCULATION TEST. Rabbit inoculated $\bar{c}$ ·01 mgm. of tubercle.

PROGRESS.

Date.	Weight.	State.
Oct. 10	2700 gms.	Operation.
Oct. 15	2750 gms.	-
Oct. 20	2700 gms	-
Oct. 27	2500 gms	-
Oct. 30	2300 gms.	-
Nov. 1	2000 gms.	Died.

POST MORTEM EXAMINATION. Animal progressively lost in weight and died upon Nov. 1st., 22 days after inoculation. There was great general wasting; no enlarged glands. Both lungs were simply solid with tubercle. Numbers of follicles in both kidneys: number of small follicles in spleen: no follicles in liver.

RESULT. General dissemination of tubercle $\bar{c}$ ·01 mgm. of Tubercle Bacilli.

Combined results show that in this case one is dealing with a Bovine Bacillus.

EXPERIMENT/

EXPERIMENT NO. 12.

J.Y. 3 years.

HISTORY. Three months before admission pain was complained of in the right ankle and at the same time the child suffered from a tuberculous empyema: the joint had become more and more swollen, and gradually it acquired all the characters of a tuberculous joint.

FAMILY HISTORY. Father and mother alive: one of them has chest trouble: child almost certainly has phthisis: hence the tuberculous empyema.

PREVIOUS HISTORY. Breast fed child: may occasionally have had cow's milk. History of chest trouble as stated.

Upon Jan. 10th the ankle joint was excised and a pure synovial tubercle found: a portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS.

Date.	Weight.	State.
Jan. 10	644 gms.	Operation.
Jan. 20	603 gms.	
Jan. 25	626 gms.	No change.
Feb. 1	587 gms.	Weight going down;but no evidence of TB. Glands,&c.
Feb. 8	543 gms.	T.B. Glands.
Feb. 14	493 gms.	Losing weight.
Mar. 1	450 gms.	Still losing weight; T.B. Glands & tumour & cachexia

Animal/

Animal killed March 1st.

POST MORTEM EXAMINATION. The groin glands upon both sides are tuberculous, also the axillary glands.

THORAX. Both lungs contain a number of small epithelioid tubercles. The peri-bronchial glands are healthy.

ABDOMEN. The spleen is enlarged and riddled with tubercles: there are tubercles also in the liver. No tubercles in the kidneys.

Cultures were made upon Egg Medium from all the available sources.

TESTS.

A. GENERAL APPEARANCE OF CULTURES. The organism was very troublesome to grow and it grew with great slowness: it spread diffusely over the surface of the medium and there was no tendency towards piling up of the growth. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS. The majority of the organisms are short and squat; one or two of them are longer: there are no aberrant forms: there are some, however, which show nodular staining. Characters are doubtful, some resemble Human and some Bovine.

C. SPECIAL CULTURE REACTION. Inoculation of Glycerine/

Glycerine Egg Medium produced a growth which in every respect was less profuse than the growth upon plain Egg Medium. Characters in keeping with a Bovine Bacillus.

INOCULATION TEST. Rabbit inoculated ē ·01 mgm. of Tubercle bacillus Oct. 10th.

PROGRESS.

Date.	Weight.	State.
Oct. 10	2100 gms.	Operation.
Nov. 4	2100 gms.	No change.
Nov. 14	2200 gms.	Gaining weight.
Nov. 21	2200 gms.	No change.
Nov. 27	2300 gms.	Animal examined.

POST MORTEM EXAMINATION. There is no sign of wasting: there is abundant subcutaneous fat. The superficial glands and lymphatics are healthy.

THORAX. Both lungs contain a few scattered epithelioid follicles: no sign of caseation and they are obviously healing and retrogressive.

ABDOMEN. The liver, the spleen and the other abdominal organs are perfectly healthy. This in fact is a chronic retrogressive tuberculosis, Human in type.

While some of the tests in this case would appear to point to the fact of the organism being/

being Bovine, the inoculation test, which alone one must consider as absolute, is sufficient to prove the organism to have been Human in type.

EXPERIMENT NO. 13.

A. M. $2\frac{10}{12}$ years.

HISTORY. Seven months ago swelling appeared in the left hand and the left foot: abscesses formed and discharged: a swelling later appeared behind the left knee: they all formed tuberculous abscesses and similar ones formed upon the inner side of the right thigh and upon the right side of the face.

FAMILY HISTORY. Father is healthy: mother is also strong: one brother quite healthy.

PREVIOUS HISTORY. Breast fed until 5 weeks old: then fed upon Horlick's Malted Milk: after 10 months was fed upon cow's milk. Right ear has discharged: abdomen is swollen.

January 20th the head of the metatarsal and astragalus were scraped: the second phalanx was excised. Some of the tuberculous material was inoculated into a guinea-pig.

PROGRESS/

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Jan. 20	334 gms.	Operation.
Jan. 25	276 gms.	
Feb. 1	282 gms.	No change.
Feb. 8	287 gms.	No change.
Feb. 16	269 gms.	Losing weight; TB. sore in right groin.
Mar. 1	240 gms.	Still losing weight.

Animal killed March 1st.

TESTS.

A. GENERAL APPEARANCE OF CULTURES. There was an entire absence of any tendency towards piling up of the growth: it began in a number of discrete and independent areas and these coalescing spread over the surface of the medium in a ground glass appearance: characters of the Bovine bacillus.

B. MORPHOLOGICAL CHARACTERS. Films show numerous acid fast bacilli: they are very short and squat: they stain equally and readily: no nodular staining. There are no branched or aberrant forms. Characters of the Bovine Bacillus.

C. SPECIAL CULTURE TEST. There was no tendency towards profuse growth upon the Glycerine Medium; it grew much less vigorously than that upon the Plain/

Plain Egg. Characters of the Bovine Bacillus.

INOCULATION TEST. Rabbit inoculated with ·01 mgm. of tubercle.

Date.	Weight.	State.
June 4	2233 gms.	Injected.
June 10	2220 gms.	No change.
June 20	2000 gms.	Beginning to lose weight.
June 28	1695 gms.	Losing weight & much thinner.
July 5	1590 gms.	-
July 12	1500 gms.	-
July 20	1482 gms.	-
July 27	1400 gms.	-

POST MORTEM EXAMINATION. August 1st. Great general wasting: no enlargement of superficial glands.

THORAX. Both lungs are simply a mass of tubercles, large, and rapidly caseating. The peribronchial glands are similarly affected.

ABDOMEN. Spleen is not affected: there are some tubercles scattered throughout the liver: numerous tubercles in both kidneys: tubercles scattered over the peritoneum.

RESULT. Bovine tubercles.

CONFIRMATORY/

CONFIRMATORY INOCULATION TEST. Rabbit inoculated c ·01 mgm. of tubercle bacilli, October 10th.

PROGRESS.

Date.	Weight.	State.
Oct. 10	2250 gms.	Operation.
Nov. 4	2200 gms.	No change.
Nov. 14	2100 gms.	No change.
Nov. 21	2000 gms.	No change.
Nov. 22	1950 gms.	Losing weight.

POST MORTEM EXAMINATION. November 22nd. Losing weight as shown in weight scheme. Both lungs riddled with tubercles: many of them are beginning to caseate. Liver.- Small tubercles throughout liver. Spleen.- No evidence of tubercles. Both kidneys are riddled with small follicles beginning to caseate.

RESULT. General dissemination of tubercle.

RESULT. Bovine.

The tests employed in this case show that the organism is Bovine in type.

EXPERIMENT NO. 14.

H. J. $6\frac{6}{12}$ years.

HISTORY. Six months ago the child sustained an accident to the right foot; an axe falling upon it there was some bleeding. An abscess developed

at/

at the site 6 weeks later and an X ray showed that the bone was diseased. The fifth metatarsal was affected.

FAMILY HISTORY. Father and mother alive and well. Six children: one has Spastic Paraplegia: others are all well.

PREVIOUS HISTORY. Breast fed: measles when 5 years old: No history of tubercle in family etc.

January 24th the bone was excised and a portion introduced into a guinea-pig.

PROGRESS OF GUINEA-PIG. B.

Date.	Weight.	State.
Feb. 8	156 gms.	Operation.
Feb. 16	170 gms.	No change.
Mar. 1	214 gms.	Gaining weight, no change.
Mar. 9	188 gms.	Losing weight.
Mar. 17	182 gms.	Animal examined.

POST MORTEM EXAMINATION. The groin glands on each side were enlarged and tuberculous: the left axillary glands were likewise infected.

THORAX. Both lungs contained a number of small follicles just beginning to caseate.

ABDOMEN. The spleen was a mass of tubercle: the liver also contained a few tubercles.

Cultures/

Cultures were made from all the available sources.

TESTS.

A. GENERAL APPEARANCE OF ORIGINAL CULTURES.

The most noticeable feature was the tendency towards piling up of the growth: it extended in a foliaceous manner over the surface of the medium. Characters in keeping with a Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The organisms upon an average are long: there are however some small ones: they show distinct nodular staining: there are no aberrant or branched forms. . Characters in keeping with a Human Bacillus.

C. SPECIAL CULTURES TEST.

It was most noticeable that the organism when inoculated upon Glycerine Egg tubes grew much more readily than upon Plain Egg. Characters in keeping with a Human Bacillus.

INOCULATION TEST.

TEST D. One rabbit inoculated with ·01 mgm. of emulsion June 5th.

PROGRESS/

PROGRESS.

Date.	Weight.	State.
June 5	1540 gms.	Operation.
June 12	1400 gms.	No change.
June 20	1520 gms.	do.
June 28	1470 gms.	do.
July 5	1490 gms.	Beginning to gain in weight.
July 17	1500 gms.	Still gaining.
July 26	1620 gms.	Still gaining.
July 31	1640 gms.	do.
Aug. 7	1700 gms.	do.
Aug. 16	1760 gms.	Still gaining.

POST MORTEM EXAMINATION. There was an abundance of subcutaneous fat: no wasting. The superficial glands and lymphatics were healthy

THORAX. Both lungs contain a few tubercles, but they are epithelioid without any trace of caseation and they are obviously healing.

ABDOMEN. The abdominal viscera show no sign of tuberculous disease.

RESULT. Chronic retrogressive tuberculosis.

Combined results show that in this case one is dealing with a Bacillus of the Human type.

EXPERIMENT/

EXPERIMENT NO. 15.

G.Y. $2\frac{10}{12}$ years.

HISTORY. Thirteen months ago the patient strained his left hip; afterwards a limp appeared. Pain appeared in the hip and he used to start up at night screaming. The hip became flexed and there were all the evidences of tuberculous disease. He was admitted for operation treatment.

PREVIOUS HISTORY. Bottle fed; whooping cough when nine months old.

FAMILY HISTORY. Father had tuberculous cervical glands when a boy: mother quite healthy: other children are healthy.

The child was admitted to hospital and the hip excised. A portion of the diseased material was inoculated into a guinea-pig.

The subsequent history of this organism was most unusually acute. I give in detail the histories of the guinea-pigs which were used in attempting to isolate the strain. The organism was carried through six different animals; it killed each with acute tuberculosis and yet I failed/

failed to grow the organism from any of them.

Although one is devoid of absolute proof, one has no hesitation in saying that this organism is Bovine in type.

PROGRESS OF GUINEA-PIG NO. 1.

Date.	Weight.	State.
Jan. 10	393 gms.	Operation.
Jan. 20	230 gms.	Died.

Animal died January 21st.

POST MORTEM EXAMINATION. The groin glands are enlarged and tuberculous: there is a mass of caseating tubercle at the site of inoculation.

THORAX. Both lungs contain very early developing follicles.

ABDOMEN. Early developing follicles in the spleen and in the liver.

No organism grew upon culture tubes and a second animal was inoculated.

PROGRESS OF GUINEA-PIG NO. 2.

Date.	Weight.	State.
Jan. 21	278 gms.	Operation.
Jan. 25	240 gms.	No change.
Feb. 1	219 gms.	Weight going down; no enlarged glands or TB. evidence.

Animal/

Animal died February 3rd.

POST MORTEM EXAMINATION.

Guinea-pig No.3. February 4th.

Large tuberculous caseating cervical glands tuberculous liver, spleen, lung, and pericardium.

PROGRESS OF GUINEA-PIG NO. 3.

Date.	Weight.	State.
Feb. 4	174 gms.	Inoculated.
Feb. 7	170 gms.	-
Feb. 10	162 gms.	-
Feb. 14	159 gms.	Losing weight rapidly.
Feb. 16	150 gms.	
Feb. 19	138 gms.	Died.

POST MORTEM EXAMINATION. General wasting and malnutrition: tuberculous foci at site of inoculation: groin glands were tuberculous and caseating.

THORAX. Both lungs were riddled with acutely caseating tubercles: the bronchial glands were healthy.

ABDOMEN. Liver was riddled with milary tubercles. The spleen was enlarged and tuberculous. The retro-peritoneal glands were tuberculous: acute disseminated tubercle.

No organism grew and a fourth animal was inoculated.

PROGRESS/

PROGRESS OF GUINEA-PIG NO. 4.

Date.	Weight.	State.
Feb. 19	700 gms.	Inoculated.
Feb. 23	698 gms.	-
Feb. 28	685 gms.	-
Mar. 1	670 gms.	Losing weight rapidly.
Mar. 3	658 gms.	-
Mar. 5	650 gms.	-
Mar. 10	600 gms.	Animal died.

POST MORTEM EXAMINATION. Great wasting: large tuberculous glands in both groins and right axilla.

THORAX. Both lungs contain numerous tuberculous follicles: peribronchial glands are healthy.

ABDOMEN. Liver shows large caseating masses and smaller groups of tubercles: spleen is a mass of tuberculous follicles: retro-peritoneal glands are enlarged and tuberculous.

Numerous cultures were made and a guinea-pig inoculated.

PROGRESS OF GUINEA-PIG NO. 5.

Date.	Weight.	State.
Mar. 5	490 gms.	Operation.
Mar. 9	441 gms.	Losing weight; rapid diminution.
Mar. 20	400 gms.	Still losing; thought better to kill it.

Animal killed March 20th.

POST/

POST MORTEM EXAMINATION.

Guinea-pig No.5.

Superficial general wasting: marked enlargement of the left groin glands also of the left axillary glands.

ABDOMEN. Spleen simply a mass of tubercles: also numerous tubercles in liver: kidneys healthy. Retroperitoneal glands enlarged and diseased.

THORAX. Some tubercles in both lungs.

Numerous and careful cultures were made from all the available sources without result.

A sixth guinea-pig was inoculated.

PROGRESS OF GUINEA-PIG NO. 6.

Date.	Weight.	State.
May 1	554 gms.	Inoculated.
May 5	550 gms.	—
May 10	539 gms.	—
May 16	530 gms.	Losing weight rapidly.
May 24	520 gms.	—
May 30	510 gms.	—
June 2	492 gms.	Animal died.

POST MORTEM EXAMINATION. Acute tubercle general: Groin glands and axillary glands.

THORAX. Tubercles scattered through both lungs.

ABDOMEN. Tubercles in spleen: liver: retroperitoneal glands.

The/

The intense toxicity of this organism for guinea-pigs makes one feel perfectly satisfied that one is dealing in this case with a Bacillus of the Bovine type.

EXPERIMENT NO. 16.

M. S. $\frac{9}{12}$ years.

HISTORY. When the child was one month old it was noticed that the fingers were swollen: the middle fingers of both hands were first noted. The swelling has steadily increased in size: and now it affords all the signs of a tuberculous Dactylitis.

PREVIOUS HISTORY. Breast fed for three weeks and then bottle fed. No history of any other disease.

FAMILY HISTORY. Father and mother well; two children healthy.

Admitted to hospital with multiple osseous tubercle. Middle metacarpal and 1st phalanx, and 1st. phalanx of thumb of left hand: 1st phalanx of 3rd finger of right hand: 1st, 3rd and 5th metatarsals of left foot.

These were excised, and portions were inoculated into guinea-pigs.

PROGRESS/

PROGRESS OF WHITE GUINEA-PIG.

Date.	Weight.	State.
Jan. 31	195 gms.	Operation.
Feb. 8	174 gms.	No change.
Feb. 16	171 gms.	No change.
Mar. 1	190 gms	No change.
Mar. 9	185 gms.	No change.
Mar. 21	172 gms.	Animal killed.

POST MORTEM EXAMINATION. General wasting of animal. Tuberculous glands in left groin and left axilla.

ABDOMEN. Numerous tubercles in spleen; liver healthy. Retroperitoneal glands were enlarged and tuberculous.

THORAX. No appearance of tubercle in lungs or peribronchial glands.

Cultures were made from all the available sources.

TESTS.

A. GENERAL APPEARANCE OF CULTURES. The organism grew very slowly and gradually. It spread in a diffuse ground glass appearance without any tendency towards piling up of the organism. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS. The organisms are uniformly/

uniformly short: there is no nodular staining: there are no branched or aberrant forms. Characters in keeping with a Bovine Bacillus.

C. SPECIAL CULTURE TEST. Inoculation of tubes containing Glycerine Egg Medium did not produce anything of the nature of a luxuriant growth; in fact the growth was considerably delayed. Characters in keeping with a Bovine Bacillus.

INOCULATION TEST with ·1 mgm. of Tubercle.

PROGRESS.

Date.	Weight.	State.
June 6	2125 gms.	Operation.
June 12	2120 gms.	No change.
June 20	1900 gms.	Losing weight.
June 28	1760 gms.	Rapidly becoming cachectic; dying.

Animal died June 28th.

POST MORTEM EXAMINATION. June 28th.

Marked general wasting with loss of weight as stated.

THORAX. Both lungs simply riddled with tiny, rapidly caseating tubercles: tubercle in peribronchial glands.

ABDOMEN. Tubercles in liver; tubercles in both kidneys.

RESULT/

RESULT. Acute dissemination of tubercle.

CONFIRMATORY INOCULATION TEST. Rabbit inoculated $\bar{c}$ ·01 mgm. of tubercle.

PROGRESS.

Date.	Weight.	State.
Oct. 11	2200 gms.	Operation.
Nov. 4	2100 gms.	No change.
Nov. 14	1900 gms.	Losing weight.
Nov. 21	1800 gms.	-

Animal died November 21st.

POST MORTEM EXAMINATION. November 21st.

Wasting general as shown in the weight chart. No involvement of the superficial lymph glands.

THORAX. Marked general tuberculosis of both lungs. Involvement of peribronchial glands.

ABDOMEN. Numerous tubercles in liver: numerous tubercles in both kidneys: spleen simply riddled throughout with tubercles.

RESULT. Acute dissemination of tubercle - Bovine.

The combined tests show that one is undoubtly dealing with a Bovine type of organism.

EXPERIMENT NO. 17.

M. S. $\frac{10}{12}$ year.

HISTORY. Some months before admission to hospital the patient developed tuberculous dactylitis of the mid fingers of both hands: no pain or discomfort and no actual cause could be ascribed to the condition.

PREVIOUS HISTORY. Had measles when six months old; no other illness: bottle fed child.

FAMILY HISTORY. Father and mother are well; there is no history of tubercle in the family.

January 1st the child was admitted to hospital and had the diseased fingers amputated. Some of the diseased bone was inoculated into a guinea-pig.

POST MORTEM EXAMINATION. The groin and the axillary glands are tuberculous and caseating.

THORAX. Both lungs contain a number of small tubercles: the peribronchial glands are not diseased.

ABDOMEN. Liver contains many small tubercles. The spleen is riddled with tubercles of varying size, most of them caseating. Retroperitoneal glands are diseased.

Cultures/

Cultures were made from all the available sources upon Dorset's Medium.

TESTS.

A. APPEARANCE OF ORIGINAL CULTURES. The organisms were difficult to grow and spread slowly over the surface of the medium in a diffuse granular appearance. There was no tendency towards foliation of the growth. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS. All the bacilli are uniformly short. Some of them stain less readily than others. There are no branched or aberrant forms. Characters in keeping with a Bovine Bacillus.

C. SPECIAL CULTURE TEST. The growth upon Glycerine Egg grew less vigorously than the growth upon ordinary Egg. In neither case was the growth profuse. Characters in keeping with a Bovine Bacillus.

INOCULATION TEST. Rabbit inoculated with ·1 mgm of tubercle.

Date.	Weight.	State.
Jan. 6	2125 gms.	Operation.
Jan. 12	2120 gms.	-
Jan. 20	1900 gms.	Losing weight.
Jan. 28	1750 gms.	Died.

POST/

POST MORTEM EXAMINATION. January 28th.

Marked general wasting.

THORAX. Both lungs simply riddled with tubercle, small and rapidly caseating. Tubercles in peribronchial glands.

ABDOMEN. Tubercles in liver. Tubercles in both kidneys.

General disseminated Tuberculosis.

SPECIAL INOCULATION TEST. Rabbit inoculated with ·0I mgm. of tubercle.

Date.	Weight.	State.
Oct. 14	2180 gms.	Inoculated.
Nov. 4	2000 gms.	-
Nov. 17	1900 gms.	Losing weight.
Nov. 21	1760 gms.	-
Dec. 5	1500 gms.	Died.

POST MORTEM EXAMINATION. Great general wasting. The superficial glands and lymphatics are healthy.

THORAX. Both lungs are simply solid with rapidly caseating tubercles: there are some also in the pleurae.

ABDOMEN. The liver contains numerous tubercles: the spleen is enlarged and tuberculous: there are numerous tubercles in both kidneys. Acute disseminated tuberculosis.

All the tests show that in this case one is dealing with a Bacillus of the Bovine type.

EXPERIMENT/

EXPERIMENT NO. 18.

T.B. 3 years.

Twelve months ago the mother noticed that the child's left knee was swollen. The doctor was called in, and the knee was put in plaster for three months. Lately conditions have become worse, and patient was admitted to Hospital.

PREVIOUS HISTORY. Breast fed; latterly with milk and water. Measles and enlarged glands in the neck when two years old.

FAMILY HISTORY. Father and mother are healthy. Sister had weak lungs after whooping-cough.

February 8th, the knee was excised; there was a simple synovial tubercle. A portion of the diseased synovial membrane was inoculated into a guinea-pig.

PROGRESS.

Date.	Weight.	State.
Feb. 8	165 gms.	Inoculated.
Feb. 10	160 gms.	-
Feb. 16	154 gms.	-
Feb. 19	120 gms.	Weight dropping.
Feb. 21	100 gms.	-
Feb. 25	96 gms.	Examined.

POST/

POST MORTEM EXAMINATION.

Marked general wasting; small tuberculous glands in the groin.

THORAX. Some tubercles in both lungs; no involvement of the bronchial glands.

ABDOMEN. Enormous tuberculous nodules in the spleen, also in the liver. Retroperitoneal glands enlarged and tuberculous.

TESTS. A. GENERAL APPEARANCE OF CULTURES.

The organism grew slowly and with great difficulty, gradually spreading over the surface of the medium in a ground glass appearance. There was no tendency towards foliation of the growth. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The majority of the organisms are short; here and there are longer forms, which show nodular staining. Some of the organisms take up the methylene blue stain, which I adduce to be due to the loss of the wax element. Characters in keeping with a Bovine Bacillus.

C. SPECIAL CULTURAL REACTION.

Inoculation of the Glycerine Egg tube has not/

not produced any degree of a profusive growth.

Characters in keeping with a Bovine Bacillus.

INOCULATION TEST.

One rabbit inoculated with ·1 mgm. of Tubercle Emulsion.

PROGRESS.

Date.	Weight.	State.
June 7	1995 gms.	Inoculation.
June 14	1900 gms.	No change.
June 21	1820 gms.	Beginning to lose weight.
June 28	1505 gms.	Rapidly losing weight and cachectic.

Animal died June 29th.

POST MORTEM EXAMINATION.

General wasting; loss of weight as stated.

THORAX. Both lungs riddled with rapidly caseating tubercles, many tubercles in peri-bronchial glands.

ABDOMEN. Tubercles in Lien, none in any other organ.

Rapidly disseminating tubercle.

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle, October 11th.

PROGRESS./

PROGRESS.

Date.	Weight.	State.
Oct. 11	2000 gms.	Operation.
Nov. 4	1900 gms.	-
Nov. 14	1700 gms.	Animal died.

POST MORTEM EXAMINATION.

Marked general wasting. No involvement of the superficial lymph glands.

THORAX. Both lungs are markedly involved with tubercle; rapidly caseating foci everywhere. Peri-bronchial glands ditto.

ABDOMEN. Liver - no tubercle. Both kidneys markedly involved with tubercle. Spleen riddled with tubercle.

RESULT. General acute dissemination of tubercle.

The tests employed in this case leave no doubt that one is dealing in this case with a Bacillus of the Bovine type.

EXPERIMENT NO. 19.

A.K. $\frac{7}{12}$ years.

HISTORY. Tuberculous Dactylitis has developed in the third finger of the right hand, and the fore-finger/

fore-finger of the left hand. Abscess formed, and the child was sent into Hospital. The fingers were amputated.

PREVIOUS HISTORY. Bottle fed; one of the cows which supplied the milk had undoubtedly tuberculous disease of the udder.

FAMILY HISTORY. Father and mother healthy; patient is the only child.

February 16th. Some of the diseased material was inoculated into a guinea-pig.

PROGRESS.

Date.	Weight.	State.
Feb. 16	830 gms.	Operation.
Mar. 1	837 gms.	No change.
Mar. 9	875 gms.	TB. tumour;no glands.
Mar. 15	820 gms.	Glands.

Animal died March 28th.

POST MORTEM EXAMINATION.

General wasting. The superficial glands are enlarged and diseased.

THORAX. Both lungs contain a number of small tubercles, many of them caseating. Peri-bronchial glands are not diseased.

ABDOMEN. Spleen enlarged and tuberculous. Some tubercles in liver. Retroperitoneal glands are tuberculous./

tuberculous.

Cultures were made from all the possible sources.

TESTS. A. GENERAL APPEARANCE OF CULTURES.

A slowly growing organism, especially in its original culture. Some of the sub-cultures grew more vigorously, but to this of course no importance can be attached. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The organisms are short and squat, no nodular staining. There are no branched or aberrant forms. Characters in keeping with a Bovine Bacillus.

C. SPECIAL CULTURE TEST.

Both tubes grew very slowly, and the Glycerine tubes were if anything more unproductive than the plain tubes. Characters in keeping with a Bovine Bacillus.

INOCULATION TEST.

Rabbit inoculated with ·1 mgm. of Bacillary Emulsion.

PROGRESS./

PROGRESS.

Date.	Weight.	State.
Jan. 9	2125 gms.	Operation.
Jan. 14	2000 gms.	No change.
Jan. 20	2200 gms.	-
Jan. 28	1950 gms.	No change.

Animal died February 1st.

POST MORTEM EXAMINATION.

General wasting, but not very marked. No involvement of the superficial lymph glands.

THORAX. Both lungs are simply a mass of rapidly caseating tubercles. The peribronchial glands are also involved.

ABDOMEN. Numerous tubercles scattered throughout spleen. Numerous tubercles in both kidneys. Tubercles in Liver.

RESULT. General disseminated tuberculosis.

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Oct. 11	1760 gms.	Operation.
Nov. 4	1500 gms.	-
Nov. 7	1480 gms.	-
Nov. 8	1460 gms.	-

Animal/

Animal died.

POST MORTEM EXAMINATION. November 8th.

Considerable general wasting. There was no involvement of the superficial lymph glands.

THORAX. Very marked involvement of both lungs; acutely congested and simply riddled with tubercle. Involvement also of peri-bronchial glands.

ABDOMEN. Both kidneys are riddled with tubercles. Liver simply riddled also with tubercles. Spleen also largely infected with tubercle.

RESULT. Very acute dissemination of Tubercle.

The tests employed in this case show definitely that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT NO. 20.

G.S. $4\frac{2}{12}$ years.

HISTORY. In the summer of 1910 the child fell and hurt its knee. The part was swollen, but gradually the swelling went away. The swelling involved the upper third of the left tibia. An X ray photograph showed a focus of disease, with a central sequestrum.

FAMILY/

FAMILY HISTORY. Father and mother are healthy; grandmother died of consumption. Two children, healthy.

PREVIOUS HISTORY. Breast fed until 18 months old, but during the day it was put in a Day Nursery, where it had plain milk. Whooping-cough when two years old.

February 14th. The upper third of the tibia was resected, and a portion of the diseased bone implanted into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Feb. 14	877 gms.	Operation.
Feb. 16	815 gms.	No change.
Mar. 1	857 gms.	No change.
Mar. 9	853 gms.	Enlarged glands.
Mar. 27	943 gms.	Gaining weight; enlarged glands more marked.
Apr. 10	900 gms.	Beginning to lose weight.
Apr. 30	870 gms.	Still losing.
May 14	850 gms.	Still losing; animal killed.

The character of the disease in this case calls for some interesting observations - its marked chronicity, three months without producing much cachexia - and yet accompanied by considerable/

considerable glandular involvement.

POST MORTEM EXAMINATION. May 14th.

The special features of this case were the great degree of lymphatic involvement, coupled with a remarkably small visceral infection, and in addition the unusually long and chronic character of the disease. The lymphatic glands in both groins were markedly involved with tubercle, and in each case the interior of the gland was breaking down. The axillary glands were not so much involved. The spleen showed small caseating nodules. Both lungs contained a number of small epithelioid follicles, clear and glassy in appearance.

TESTS. A. GENERAL APPEARANCE OF CULTURE.

The culture grew rather slowly; it spread diffusely over the surface of the medium, and might well be called ground glass in appearance; there was no tendency towards piling up of the culture. Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The Bacilli were short and squat; they did not/

not show nodular staining, and there were no branched or aberrant forms. Characters in keeping with a Bovine Bacillus.

C. SPECIAL CULTURE TEST.

Inoculation of a Glycerine Medium does not produce any alteration in the growth, in fact it grows more profusely upon Plain Medium than upon Glycerine Medium. Characters in keeping with a Bovine Bacillus.

INOCULATION TEST.

June 17th, one rabbit inoculated with ·1 mgm. of Emulsion. Weight = 2150 gms.

PROGRESS.

Date.	Weight.	State.
June 17	2150 gms.	Operation.
June 18	2000 gms.	Slight loss in weight, but unappreciable.
June 20	1920 gms.	No change.
June 21	1915 gms.	Still losing weight.
July 10	1900 gms.	-
July 20	1875 gms.	-
July 30	1850 gms.	No appreciable change.
Aug. 18	1800 gms.	

POST MORTEM EXAMINATION. August 19th.

Some general wasting and loss of flesh.

No involvement of superficial glands.

THORAX./

THORAX. Both lungs are greatly involved with tubercle; simply masses of caseating tubercles. No involvement of peri-bronchial glands.

ABDOMEN. Liver and spleen are healthy. Both kidneys are markedly involved with tubercle.

There are a number of tubercles in both ovaries.

RESULT. Acute General Tuberculosis.

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Oct. 11	1800 gms.	Operation.
Nov. 4	2100 gms.	-
Nov. 14	1850 gms.	No change.
Nov. 21	1800 gms.	No change.
Nov. 22	1790 gms.	Animal died.

POST MORTEM EXAMINATION.

Some wasting. No glandular involvement.

THORAX. Both lungs simply a mass of tubercle.

ABDOMEN. Tubercles in both kidneys. Tubercles in liver, none in spleen. Acute dissemination of tubercle.

RESULT/

RESULT. All the tests in this case leave no doubt that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT NO. 21

K.R. 2 years.

HISTORY. About 12 months ago the patient was kicked behind the right ear. A swelling appeared, about the size of a hen's egg; it was an ordinary bruise; it gradually went away, but there developed a soft fluctuating swelling over the right fronto-parietal suture, an abscess secondary to disease of the underlying bone.

PREVIOUS HISTORY. Breast fed until 14 months old. has had measles, rickets, chicken-pox and whooping-cough.

FAMILY HISTORY. Father and mother are healthy, one child died of Pneumonia.

February 14th. An operation was performed for tuberculous disease of the frontal bone, with secondary abscess. A portion of the tissue was inoculated into a guinea-pig.

PROGRESS/

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Feb.14	183 gms.	Operation.
Feb. 16	171 gms.	No change.
Mar. 1	197 gms.	No change.
Mar. 9	225 gms.	Glands & tumour TB.
Mar. 18	220 gms.	Animal examined.

POST MORTEM EXAMINATION.

Enlargement of the groin and axillary glands, they are tuberculous and caseating.

THORAX. Both lungs contain numerous small tubercles. The peri-bronchial glands are not enlarged.

ABDOMEN. Tubercles in spleen, also in liver. There was tuberculous disease of the retro-peritoneal glands.

Cultures were made from all the available sources.

TESTS. A. GENERAL APPEARANCE OF CULTURE.

The culture grew rapidly in piled up and foliaceous masses; it showed the typical appearances that are usually associated with a culture of the Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The organisms are long, thin and delicate.

They/

They show distinct nodular staining. There are no branched forms. Characters in keeping with a Human Bacillus.

C. SPECIAL CULTURE TEST.

There was no doubt that the Glycerine Egg tubes grew much more vigorously than the plain Egg tubes. Characters in keeping with a Human Bacillus.

INOCULATION TEST.

Rabbit inoculated with ·1 mgm. of tubercle.

PROGRESS.

Date.	Weight.	State.
June 17	2700 gms.	Operation.
June 22	2500 gms.	No change.
June 28	2400 gms.	No change.
Aug. 18	2447 gms.	Gaining weight.
Aug. 28	2530 gms.	-
Sep. 8	2690 gms.	-
Sep. 20	2790 gms.	Gaining weight steadily Animal examined.

POST MORTEM EXAMINATION.

No wasting. The superficial glands and lymphatics are not diseased.

THORAX. There are a few healing and retrogressive tubercles/

tubercles in the lungs.

ABDOMEN. There is no evidence of tubercle in any of the abdominal viscera.

RESULTS. Chronic Retrogressive Tuberculosis.

Tests show that in this case one is dealing with a Bacillus of the Human type.

EXPERIMENT NO. 22.

W.B. $2\frac{1}{2}$ years.

HISTORY. Three months ago the child fell and twisted the ring finger of its right hand. The finger became swollen and it was put by the doctor in splints. There was no benefit, and the child was sent into Hospital with a typical tuberculous Dactylitis.

PREVIOUS HISTORY. Breast fed, but has always had cows' milk in addition.

FAMILY HISTORY. Father alive and well; mother had pleurisy. No other children.

January 10th the child was admitted to Hospital, and the finger amputated at the Metacarpo-phalangeal joint. A portion of the diseased bone was inoculated into a guinea-pig.

PROGRESS/

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Jan. 10	485 gms.	Operation.
Jan. 20	331 gms.	Developed Pneumonia.
Jan. 25	295 gms.	Recovered from Pneumonia; TB. tumour at seat of inoculation.
Feb. 1	313 gms.	TB. glands in direct evidence.
Feb. 8	292 gms.	Cachexia.

Killed, February 9th.

POST MORTEM EXAMINATION.

The groin glands were rapidly caseating.

THORAX. Both lungs contained numerous tubercles; the peri-bronchial glands were healthy.

ABDOMEN. Spleen was enlarged and tuberculous; liver also contained a number of tubercles. The retroperitoneal glands are caseating.

Cultures were made from all the available sources.

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

It grew only after great difficulty, and then in a number of discrete points. There was no tendency towards piling up or exfoliation of the growth. No special characters.

B. MORPHOLOGICAL CHARACTERS.

The/

The organisms vary greatly in size; some of them are long and some short; the longer ones show distinct nodular staining. Characters are doubtful; they rather resemble the Human Bacillus.

C. SPECIAL CULTURE TEST.

Cultures made upon Glycerine Egg Medium do not produce a more prolific growth than the ordinary Egg culture; in fact they produce a much less profuse growth. Characters in keeping with the Bovine Bacillus.

INOCULATION TEST.

One rabbit inoculated with ·1 mgm. of Tubercle.

PROGRESS.

Date.	Weight.	State.
Aug. 14	1625 gms.	Inoculated.
Aug. 20	1600 gms.	-
Aug. 23	1586 gms.	Continued loss
Aug. 28	1400 gms.	in weight;
Aug. 31	1220 gms.	animal becoming
Sep. 2	1170 gms.	very thin.
Sep. 5	1010 gms.	Died.

POST MORTEM EXAMINATION.

Marked general wasting; no glands.

THORAX.

THORAX. Both lungs are simply riddled with rapidly caseating tubercle. The peribronchial glands are not affected.

ABDOMEN. The spleen contains a number of small foci of tubercle. Both kidneys show the presence of a number of tiny caseating foci. No signs of tubercle in lungs.

RESULT. General dissemination of tubercle, 20 days duration, with acute toxaemia and death.

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Oct. 10	1650 gms.	Operation.
Nov. 4	1450 gms.	Loss in weight.
Nov. 6	1400 gms.	Animal died.

POST MORTEM EXAMINATION. November 6th.

General wasting and progressive loss in weight, as stated in weight table. No involvement of the lymph glands.

THORAX.

THORAX. Both lungs were simply studded with tubercles, just beginning to caseate.

ABDOMEN. Tubercles were present in the left kidney, and there was a suspicion of one in the left supra-renal. In the liver there were several distinct tubercles.

RESULT. General dissemination of acute tubercle, after inoculation with ·01 mgm. Bovine infection.

All the tests employed in this case show that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT NO. 23

D.D. $1\frac{7}{12}$ years.

HISTORY. About four months ago the mother says she gave the child's foot a wrench. Two weeks later the joint became swollen, chiefly on the anterior and inner aspect; the child would not put its foot to the ground. An abscess formed and was opened. The child was admitted to Hospital for tuberculosis of the ankle joint.

PREVIOUS/

PREVIOUS HISTORY. Bottle fed until 8 months old, and then from various kinds of soft food.

FAMILY HISTORY. Nothing known regarding its history, has been an adopted child.

March 2nd, the child was admitted to the Hospital with tuberculous disease of the ankle joint; the joint was excised and a guinea-pig inoculated.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Mar. 2	754 gms.	Operation.
Mar. 10	700 gms.	-
Mar. 20	694 gms.	-
Mar. 30	680 gms.	-
Apr. 4	650 gms.	Died.

POST MORTEM EXAMINATION.

The groin glands were markedly diseased with tubercle. The axillary glands were also diseased and caseous.

THORAX. Both lungs contain a number of tubercles, many of them large and caseating.

ABDOMEN. The spleen contains numerous caseating tubercles, also the liver. The retroperitoneal glands/

glands are enlarged and rapidly caseating.

Cultures were made from all the available sources.

TESTS. A. GENERAL APPEARANCE OF CULTURE.

The culture grew in the manner one associates with a Bovine tubercle; it spread over the surface of the medium in a diffuse ground glass appearance.

B. MORPHOLOGICAL CHARACTERS.

The majority of the organisms are short; some of them are longer, and these show nodular staining, but they are distinctly in the minority. Characters are doubtful.

C. SPECIAL CULTURE TESTS

These are in keeping with the reaction of a Bovine Bacillus. The growth upon Glycerine Egg is not in any way more profuse than the growth upon ordinary Egg.

INOCULATION TEST.

Rabbit inoculated August 18th, with ·1 mgm. of Tubercle Bacilli.

PROGRESS/

PROGRESS.

Date.	Weight.	State.
Aug. 18	1435 gms.	Inoculated.
Aug. 20	1400 gms.	
Aug. 25	1392 gms.	Losing weight
Aug. 28	1300 gms.	
Aug. 30	1218 gms.	continually.
Sep. 3	1200 gms.	
Sep. 6	1011 gms.	Animal died.

POST MORTEM EXAMINATION. September 6th.

General wasting; no involvement of the superficial glands.

THORAX. Both lungs are simply riddled with caseating tubercles.

ABDOMEN. Liver shows the presence of a number of tubercles. Both kidneys contain a number of tubercles. Spleen is tuberculous.

RESULT. General dissemination of tubercle in 18 days.

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Oct. 12	2200 gms.	Operation.
Nov. 4	2200 gms.	-
Nov. 14	1800 gms.	-
Nov. 18	1680 gms.	Animal died.

POST/

POST MORTEM EXAMINATION.

General wasting, as shown by the progressive loss in weight.

THORAX. Marked involvement of both lungs, simply solid with tubercle. Involvement of peribronchial glands.

ABDOMEN. Liver riddled with tubercles. Spleen riddled with tubercles. Both kidneys show the presence of large quantities of tubercles.

RESULT. General dissemination of tubercle after 36 days.

All the tests employed on this case show that one is dealing with a Bacillus of the bovine type.

EXPERIMENT NO. 24.

A.M. $1\frac{10}{12}$ years.

HISTORY. Patient has suffered from a succession of tuberculous lesions.- Mastoid disease - tuberculous cervical glands - tuberculous dactylitis - tuberculous disease of the ankle joint. She is now under treatment for tuberculous disease of the lower end of the right humerus. She has apparently got some source of infection which produces/

produces a haematogenic dissemination of tubercle over the whole body.

PREVIOUS HISTORY. Bottle fed child; no special care is paid to the milk.

FAMILY HISTORY.

No history of tubercle in the family.

February 28th. Patient was admitted to Hospital and the lower half of the right humerus was resected for tuberculous osteomyelitis. A portion was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Feb. 28	393 gms.	Operation.
Mar. 9	390 gms.	No change.
Mar. 16	360 gms.	Losing weight; Gland appeared.
Mar. 22	330 gms.	Looks ill, weight dropping.

March 23rd, animal killed.

POST MORTEM EXAMINATION.

The groin glands upon both sides are tuberculous; the axillary glands are likewise diseased.

THORAX. Both lungs contain a number of caseating tubercles/

tubercles. The peribronchial glands are healthy.

ABDOMEN. The spleen is enlarged and tuberculous. The liver contains a number of small tubercles. The retroperitoneal glands are tuberculous.

Cultures were made from all the available sources.

TESTS. A. GENERAL APPEARANCE OF CULTURES.

The organism grew slowly and with difficulty; it extended gradually over the surface of the medium in a ground glass appearance. In one tube there was an attempt at foliation, but it was a solitary exception. The characters are in keeping with those of the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

All the organisms are small; there is no sign of Bipolar staining; there are no branching or aberrant varieties.

C. SPECIAL CULTURE TEST.

Upon Glycerine Egg and Egg the organism grew badly. The growth upon the Glycerine Medium was less profuse than the growth upon plain Egg.

INOCULATION TEST.

Rabbit inoculated with ·1 mgm. of Bacilli,

August/

August 18th.

PROGRESS.

Date.	Weight.	State.
Aug. 18	1575 gms.	Inoculated.
Aug. 20	1580 gms.	No change.
Aug. 25	1360 gms.	Losing weight.
Aug. 30	1200 gms.	Still.
Aug. 31	1120 gms.	Still.

Animal died September 2nd.

POST MORTEM EXAMINATION.

There is considerable general wasting and rapid cachexia. The superficial glands and lymphatics are not diseased.

THORAX. Both lungs are simply solid with acutely caseating tubercle; they are everywhere. The peribronchial glands are likewise diseased.

ABDOMEN. There are numerous specimens of tubercle in the liver, spleen and kidneys.

RESULT. General dissemination of acute tubercle.

CONFIRMATORY INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle.

PROGRESS/

PROGRESS.

Date.	Weight.	State.
Oct. 2	1570 gms.	Operation.
Nov. 4	1700 gms.	-
Nov. 10	1400 gms.	-
Nov. 14	1200 gms.	Died.

POST MORTEM EXAMINATION.

Marked general wasting. No evidence of superficial gland involvement.

THORAX. Both lungs simply a mass of tubercle, rapidly caseating. Peribronchial glands are similarly involved.

ABDOMEN. Tubercle in Liver, in spleen, and in both kidneys.

RESULT. General dissemination of tubercle.

RESULT. Bovine.

The tests employed on this case leave no doubt that one is dealing with an organism of the Bovine type.

EXPERIMENT NO. 25.

W.B. 8 years.

HISTORY. Eleven months ago the patient was operated on for tuberculosis of the tibia. She hasnow developed/

developed tuberculous dactylitis of the first phalanx of the right hand.

PREVIOUS HISTORY. Bottle fed baby, but fed upon milk which is first brought to the boil. Tuberculous peritonitis developed when four years old. Tuberculosis of tibia six months ago.

FAMILY HISTORY. There was no history of tubercle to be obtained. Patient was admitted to Hospital in order to have the finger amputated. A portion of the diseased bone was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Mar. 21	339 gms.	Operation.
Mar. 27	318 gms.	Losing weight.
Apr. 4	300 gms.	-
Apr. 14	298 gms.	-
Apr. 28	292 gms.	-
May 5	250 gms.	-
May 12	230 gms.	-
May 22	200 gms.	Animal died.

POST MORTEM EXAMINATION. May 22nd.

Left groin gland enlarged and tuberculous, also retroperitoneal glands. Many tubercles in spleen. Small tubercles in both lungs. General wasting. No other signs of Tuberculosis.

Cultures/

Cultures were made from the diseased glands and from the spleen.

TESTS. A. APPEARAMCE OF ORIGINAL CULTURE.

The organism grew slowly; what one may term a dysgonic growth; it extended gradually over the medium in a ground glass appearance. Characters in keeping with the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The organisms are uniformly short and squat; there is no appearance of nodular staining, and there are no branched or aberrant forms. Characters in keeping with the Bovine Bacillus.

C. SPECIAL CULTURE TEST.

Characters in keeping with the Bovine Bacillus.

C. SPECIAL CULTURE TEST.

The growth upon Glycerine Egg Medium was less plentiful than that upon ordinary Egg. Characters in keeping with the Bovine Bacillus.

INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle.

PROGRESS/

PROGRESS.

Date.	Weight.	State.
Aug. 23	1900 gms.	Operation.
Aug. 30	2000 gms.	-
Sep. 5	1820 gms.	-
Sep. 12	1700 gms.	-
Sep. 19	1650 gms.	-
Sep. 26	1400 gms.	Progressively
Sep. 30	1200 gms.	lost weight.
Oct. 3	1198 gms.	Died.

POST MORTEM EXAMINATION.

General wasting; no affection of the superficial lymph glands.

THORAX. Both lungs were simply riddled with tubercle; large caseating tubercles throughout its whole area. Infection of the peribronchial glands.

ABDOMEN. Both kidneys were riddled with tubercle; no tubercle visible in other organs.

The tests employed leave no doubt that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT NO. 26.

J.L.P. 6 years.

HISTORY. When the child was two years old he had a fall, which injured the right knee. The part became/

became red and swollen; the knee was put in extensions and then in plaster for 18 months. This did no good, and patient was admitted to Hospital for treatment.

PREVIOUS HISTORY. Breast fed until one year old, and then upon cows' milk; no precaution taken with the milk in the way of boiling, etc.

FAMILY HISTORY. Father and mother are healthy. One sister has got pulmonary tuberculosis.

February 22nd. The knee joint was excised, and a guinea-pig was inoculated with some of the diseased tissue.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Feb. 22	260 gms.	Operation.
Mar. 1	261 gms.	No change.
Mar. 9	276 gms.	No change.
Mar. 16	230 gms.	Wasting.
Mar. 23	215 gms.	Still losing weight.
Mar. 26	195 gms.	Cachexia.

Animal killed March 26th.

POST MORTEM EXAMINATION. March 26th.

General wasting. Marked enlargement of glands in left groin. Glands tuberculous and caseating. No other enlarged glands.

Spleen/

Spleen is enlarged and tuberculous. No other tubercle.

Cultures were made from the affected glands and from the spleen.

TESTS. A. GENERAL APPEARANCE OF CULTURE.

The Bacillus grew rapidly, and upon ordinary Egg Medium it formed piled-up and foliaceous masses. Characters in keeping with a Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

Films show different varieties of organism. Some of the Bacilli are quite short, others are of considerable length, and these latter show beautifully the phenomenon of nodular staining. Characters in keeping with a Human Bacillus.

C. SPECIAL CULTURE TEST.

The sub-cultures upon Glycerine Egg and upon Plain Egg grew luxuriously upon both media, but without doubt the growth upon Glycerine Egg was the more profuse. Characters in keeping with a Human Bacillus.

INOCULATION TEST.

Rabbit/

Rabbit inoculated with ·1 mgm. of Tubercle.

PROGRESS.

Date.	Weight.	State.
Aug. 18	1407 gms.	Injected.
Aug. 20	1500 gms.	
Sep. 7	1420 gms.	Has not lost
Sep. 14	1300 gms.	
Sep. 26	1250 gms.	any degree of
Oct. 7	1300 gms.	
Oct. 14	1320 gms.	weight.
Oct. 23	1500 gms.	

POST MORTEM EXAMINATION.

There was a small point of tubercle in the right axillary gland. The only other evidence of tubercle was in the shape of a few healing retrogressive tubercles in the lungs and a single focus in the kidney.

RESULT. Retrogressive tubercle.

The tests in this case show that one is dealing with a Bacillus of the Human type.

EXPERIMENT NO. 27

J.R. $2\frac{4}{12}$ years.

HISTORY. About six months ago the mother noticed that the left ankle was swollen; it was diagnosed as tuberculous disease, and the foot was put/

put in plaster of Paris. It was kept in this for some considerable time, but when the case was taken off the disease was found to be progressing. The case was admitted to Hospital for treatment.

PREVIOUS HISTORY. Breast fed until 13 months old.

FAMILY HISTORY. Patient's brother suffers from tuberculosis of the ankle joint. Father and mother are healthy.

February 10th. The case was admitted to Hospital, and the ankle joint scraped. A portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Feb. 10	420 gms.	Inoculated.
Feb. 24	400 gms.	-
Mar. 10	398 gms.	-
Mar. 20	372 gms.	-
Mar. 30	350 gms.	-
Apr. 5	320 gms.	-
Apr. 10	300 gms.	Killed & Examined.

POST MORTEM EXAMINATION.

Tuberculous glands at groin and axilla. Tubercles in both lungs. Tubercles in spleen and liver. Cultures made from glands, lungs and/

and liver.

TESTS. A. CHARACTER OF ORIGINAL CULTURE.

The growth upon the original tubes was distinctly sluggish; in places it tended to collect in soft, rounded masses, but gradually it extended diffusely over the surface.

Characters in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The Bacilli are small, some unusually broad; they stain equally and readily. Some of them show nodular staining. Characters doubtful.

C. SPECIAL CULTURES.

Cultures made upon Glycerine Egg do not grow in any profusion. The control cultures upon Plain Egg medium are more prolific.

Characters in keeping with a Bovine Bacillus.

D. INOCULATION TEST.

Rabbit inoculated with ·01mgm. of Tubercle.

PROGRESS.

Date.	Weight.	State.
Oct. 28	2350 gms.	Injected.
Nov. 4	2340 gms.	-
Nov. 8	2300 gms.	-
Nov. 12	2100 gms.	-
Nov. 16	2000 gms.	-
Nov. 20	1850 gms.	-
Nov. 23	1600 gms.	Animal died.

POST/

POST MORTEM EXAMINATION. November 23rd.

Great wasting and loss in weight, as shown in chart.

THORAX. Both lungs were absolutely solid with tubercle, nothing but masses of rapidly caseating tubercles. Peribronchial glands are diseased.

ABDOMEN. Tubercle nodules in left kidney. Tubercle follicles in liver. Spleen enlarged, but shows no nodules (macroscopic).

RESULT. General dissemination of tubercle, with death in four weeks.

The tests employed show that here one is dealing with a Bacillus of the Bovine type.

EXPERIMENT NO. 28

G.N. 2 years.

HISTORY. Patient developed tuberculous dactylitis about three months ago. In spite of conservation treatment, the condition has not improved, and the patient was admitted for treatment to Hospital.

PREVIOUS HISTORY. Fed on cows' milk. The child has had tuberculous lesions prior to this one, tubercle of the ankle joint and tubercle of the cervical glands.

FAMILY/

FAMILY HISTORY. No history of tubercle in the family.

March 30th. The child was operated upon and the finger removed. A portion was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Mar. 30	537 gms.	Operation.
Apr. 5	539 gms.	In statu quo.
Apr. 12	530 gms.	No change.
Apr. 30	500 gms.	Enlarged glands.
May 10	468 gms.	Losing weight.
May 17	450 gms.	Do.
May 22	400 gms.	Animal died.

POST MORTEM EXAMINATION.

Tuberculous groin glands on left side; no other enlarged glands. The retroperitoneal glands are not enlarged. The spleen is much affected. There are scattered follicles of Tubercle in both lungs. No other evidence of Tubercle.

Cultures were made from all the affected glands.

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

The original culture did not grow very readily; it gradually spread in small circumscribed points over the surface of the medium;

no/

no tendency towards piling up being noticed. Characters of the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

An unusually short Bacillus, stains equally and readily with Ziehl-Neelson, no sign of nodular staining. Characters of the Bovine Bacillus.

C. SPECIAL CULTURE TEST.

August 28th. Inoculations were made upon Glycerine Egg tubes and upon ordinary Egg tubes.

October 28th. All tubes inoculated have grown, but the growth upon both is feeble, certainly not more profuse on the Glycerine than on the ordinary Egg. Characters of the Bovine Bacillus.

D. INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle.

PROGRESS.

PROGRESS.

Date.	Weight.	State.
Nov. 1	2950 gms.	Inoculated.
Nov. 14	2900 gms.	-
Nov. 20	2850 gms.	-
Nov. 24	2600 gms.	-
Nov. 30	2350 gms.	Losing weight.
Dec. 4	2200 gms.	-
Dec. 7	2100 gms.	-
Dec. 11	2000 gms.	Died.

POST MORTEM EXAMINATION.

Progressive loss in weight; the sub-cutaneous fat is largely lost, especially noticeable in the peri-renal region.

THORAX. Peribronchial glands enlarged. Both lungs are simply riddled with tubercles, enormous caseating ones. Lungs do not collapse properly.

ABDOMEN. Both kidneys are riddled with tubercles, caseating. Spleen, enlarged and packed with small caseating tubercles. Liver riddled with small caseating points.

RESULT. Acute general dissemination of tubercle within 38 days.

The tests show that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT/

EXPERIMENT NO. 29

A. M. : 2 years.

HISTORY :

Patient was admitted to Hospital suffering from tuberculous disease of the elbow. There was no known cause for the trouble, and there are no special points in the case which require special mention.

PREVIOUS HISTORY :

Child was brought up on cows' milk. No precautions were taken with regard to the milk. Patient has suffered from tuberculous dactylitis.

FAMILY HISTORY :

There is no history of tubercle. The father and mother are healthy.

March 30th.

Child was admitted to Hospital and the diseased bone removed. A portion was inoculated into a guinea-pig.

Progress /

PROGRESS of GUINEA-PIG :

Date	Weight	State
March 30	569 gm.	Operation
April 5	570 gm.	In statu quo
April 12	550 gm.	Beginning to lose weight
April 25	550 gm.	Losing.
May 5	486 gm.	
May 20	480 gm.	
May 30	486 gm.	Animal died.

POST-MORTEM EXAMINATION :

At the site of inoculation there is a caseating tuberculous mass.

The groin and axillary glands in the neighbourhood are enlarged and tuberculous.

THORAX :

Both lungs contain a number of tubercles. Many of them are caseating. The peribronchial glands are not diseased.

ABDOMEN :

The spleen is riddled with tubercles. There are tubercles also in the liver. The retro-peritoneal glands are diseased.

Cultures were made from all available sources.

TESTS /

TESTS :

A. APPEARANCE of ORIGINAL CULTURES :

On the whole the culture grows slowly, with a ground-glass appearance. In one or two of the tubes there was a tendency towards piling up of the growth, but to no extent. The growth, speaking generally, was feeble.

Characters in keeping with the bovine bacillus.

B. MORPHOLOGY :

An exceedingly short bacillus. Stains equally and readily.

No sign of nodular staining.

Characters in keeping with the bovine bacillus.

C. SPECIAL CULTURES :

Upon glycerine egg and ordinary egg.

Inoculated Aug. 28th, 1911.

Oct. 28th, 1911 : Showed a growth upon both tubes : feeble, with certainly no exaggeration of growth.

Upon the glycerine medium, characters were in keeping with a bovine bacillus.

Inoculation /

INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacillus.

PROGRESS :

Date	Weight	State
Nov. 4.00	2450 gm.	Inoculated.
Nov.15.11	2400 gm.	
Nov.23.11	2120 gm.	
Nov.30.11	1950 gm.	Losing weight.
Dec. 5.11	1950 gm.	
Dec.14.11	1800 gm.	
Died	Dec. 15th, 1911	

POST-MORTEM EXAMINATION :

General wasting and loss of subcutaneous fat. No enlargement of the superficial lymph glands.

THORAX :

Lungs do not collapse at all. They entirely fill the thorax and are riddled with tubercles.

The peri-bronchial glands are enlarged and infected.

ABDOMEN /

ABDOMEN :

Both kidneys are markedly involved with tubercles.

Spleen is enlarged and dotted all over with tubercles.

Liver is infected throughout with tiny tubercles.

RESULT :

General dissemination of acute tubercle in forty days.

The tests employed show that one is dealing with a bacillus of the bovine type.

EXPERIMENT NO. 30

HISTORY :

Patient a child of four, developed tuberculous dactylitis four months ago. The condition rapidly grew worse under conservative treatment, and abscesses formed and burst. The child was admitted for treatment.

PREVIOUS HISTORY :

Patient was brought up on cows' milk. and no precaution was taken to sterilize it. Patient has /

has suffered from measles and whooping-cough.

FAMILY HISTORY :

Father and mother are both alive and well.

There is no history of tubercle to be obtained.

April 10th :

An operation was performed and the diseased finger removed. A portion was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
April 10.	412 gm.	Operation
April 20.	420 gm.	No change.
May 10.	400 gm.	No change
May 23.	395 gm.	No change.
May 30.	360 gm.	Losing weight.
June 1.	Animal	killed.

POST-MORTEM EXAMINATION : June 1st, 1911.

General wasting.

Marked enlargement of glands in groin and axilla.

Retro-peritoneal gland affected.

Marked involvement of spleen.

Tubercle in both lungs.

Cultures were made from glands and spleen.

Tests /

TESTS :

A. APPEARANCE of ORIGINAL CULTURES :

The growth was never a very profuse one. From the original culture it grew in the shape of a number of isolated colonies. round and distinct with no tendency towards piling up.

Character in keeping with a Bovine Bacillus.

B. MORPHOLOGICAL CHARACTER :

Numerous bacilli : stain readily. Many of the forms are long. They show very well marked nodular staining, or perhaps many are tiny bacilli linked together, but I think more probably the former.

Character doubtful.

C. GLYCERINE and EGG CULTURE TEST :

Subcultures upon both these media grew equally well, but in no case luxuriantly. Certainly there was no excessive luxuriance upon the glycerine.

Character in keeping with a Bovine Bacillus.

Inoculation /

INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS :

Date	Weight	State
Nov. 4.11	2250 gm.	Inoculated.
Nov.17.11	2200 gm.	
Nov.24.11	1920 gm.	
Nov.30.11	1750 gm.	Losing weight.
Dec. 4.11	1600 gm.	Animal died.

POST-MORTEM EXAMINATION :

Progressive loss in weight as shown by accompanying wasting. No enlargements or disease in the superficial lymph glands.

THORAX :

Both lungs collapse very imperfectly and are absolutely solid with tubercles, most of them caseating.

Peri-bronchial glands are diseased.

ABDOMEN :

Spleen is enlarged and studded with tubercles.

Liver contains a number of small caseating points.

Both /

Both kidneys are thickly studded with small caseating points.

RESULT :

General dissemination of acute tubercle.

The tests employed are sufficient to show that one is dealing with a bacillus of the bovine type.

EXPERIMENT NO 31

HISTORY :

Three months ago the child began to complain of pain in the elbow. No history of injury. The joint gradually became swollen, painful and stiff. A diagnosis of tuberculous disease was given.

PREVIOUS HISTORY :

Patient has been fed upon cows' milk lately, but previously she was a breast child. Had measles four years ago, and a running ear for six years. The mother says that sometimes when the child coughs she brings up hard pieces of "matter".

FAMILY /

FAMILY HISTORY :

Father and mother are healthy, and there is no history of tubercle in the family.

April 20th :

An operation was performed. Some synovial tubercle was found, and a portion of the diseased membrane inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
April 20.11	450 gm.	Operation.
April 30.11	460 gm.	
May 5.11	428 gm.	
May 15.11	400 gm.	
May 27.11	400 gm.	
	Animal died : May	27th, 1911.

POST-MORTEM EXAMINATION :

There was tuberculous disease of the groin and axillary glands.

THORAX :

The lungs were considerably infected with acute caseating follicles.

ABDOMEN :

The spleen is enlarged and simply riddled with /

with tubercles. The liver is likewise considerably diseased. The retro-peritoneal glands are diseased.

Cultures were made from all the possible sources.

TESTS :

A. ORIGINAL CULTURES : CHARACTERS :

The original cultures grew quite readily, but none with any degree of luxuriance. In one or two tubes the growth was slight.

Character is keeping with a human bacillus.

B. MORPHOLOGICAL CHARACTER :

The bacillus is longer than usual and many of them show nodular staining.

All stain readily.

Character in keeping with a human bacillus.

C. SPECIAL CULTURE TEST :

Original sub-cultures were made upon egg and glycerine egg upon Aug. 29th, 1911.

Oct. 28th, 1911 : Luxuriant growth upon glycerine egg. Simple growth upon ordinary egg.

Character in keeping with a human bacillus.

INOCULATION /

INOCULATION TEST :

One rabbit inoculated with .01 mgm. of tubercle : Oct., 1911.

PROGRESS :

Date	Weight	State
Nov. 3.11	2050 gm.	Inoculated.
Nov.10.11	2000 gm.	
Nov.20.11	2050 gm.	
Nov.30.11	2050 gm.	No change.
Dec. 5.11	2000 gm.	
Dec.12.11	1900 gm.	
Dec.18.11	1950 gm.	Keeps up its weight
Dec.25.11	2000 gm.	
Jan. 3.11	2050 gm.	Gaining weight.
Feb. 4.12	2120 gm.	Animal examined.

POST-MORTEM EXAMINATION :

There is no general wasting.

The superficial glands and lymphatics are not diseased.

THORAX :

Both lungs contain a number of small tubercles, but they are chronic and retrogressive in character.

ABDOMEN :

ABDOMEN :

There is no trace of tubercle in any of the abdominal viscera.

RESULT :

A Chronic retrogressive tuberculosis.

The tests employed show that here one is dealing with a bacillus of the human type.

EXPERIMENT NO. 32

M. E. : 1 $\frac{5}{12}$ years.

HISTORY :

Patient has gradually developed a swelling of the middle metatarsal bone of the right foot. The swelling did not at first interfere with walking, but later an abscess formed. Patient was admitted to the Sick Childrens' Hospital.

PREVIOUS HISTORY :

Patient is supposed to have been breast-fed, but she has always drunk in addition a considerable quantity of cows' milk regarding which no precaution was taken. She has had measles and whooping-cough.

FAMILY /

FAMILY HISTORY :

Father and mother are well. There is no history of tubercle to be obtained.

April 27th :

The child underwent an operation. The metatarsal bone was removed and a portion inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
April 27.	397 gm.	Operation
May 3.	360 gm.	No change
May 17.	370 gm.	Small glands in groin.
May 21.	398 gm.	Glands larger; still gaining weight.
June 7	400 gm.	Still gaining weight.
June 15.	429 gm.	No change.
June 24.	427 gm.	Animal killed and examined.

POST-MORTEM EXAMINATION :

The groin glands were enormously enlarged and their centres were entirely filled with caseous matter.

The axillary glands were also diseased.

THORAX :

Both lungs contained a number of tubercles, most of them caseating.

Peri-bronchial /

Peri-bronchial glands were not diseased.

ABDOMEN :

The spleen is much enlarged and tuberculous.

The liver contains a number of scattered follicles. The retro-peritoneal glands are also caseating.

Cultures were made from all the available sources.

TESTS :

A. ORIGINAL CULTURES : APPEARANCE :

The original cultures grew in some cases very readily, piled-up masses appearing very early.

Other tubes grew much less readily.

Character resembling a human bacillus.

B. MORPHOLOGICAL CHARACTER :

Tubercles longer than usual. Stain readily. Stain with nodular staining.

Character resembling a human bacillus.

C. SPECIAL CULTURES :

Aug. 29th, 1911 : Sub-cultures made upon egg and glycerine egg.

Oct. 28th, 1911 : The glycerine egg tubes grew very luxuriantly in a moist growth.

Character resembling a h uman bacillus.

D. /

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS :

Date	Weight	State
Nov. 4.11	1450 gm.	Inoculated.
Nov. 6.11	1460 gm.	
Nov.10.11	1400 gm.	
Nov.15.11	1380 gm.	
Nov.22.11	1300 gm.	Losing weight.
Nov.27.11	1270 gm.	Died.

POST-MORTEM EXAMINATION :

General wasting as shown in weight chart.

No involvement of the superficial lymph glands.

THORAX :

Both lungs are already very markedly involved with tubercle, most of them rapidly caseating.

No involvement of peri-bronchial glands.

ABDOMEN /

ABDOMEN :

Both kidneys are simply riddled with tubercle.

Spleen is enlarged and contains numerous small tubercles.

Liver : one or two scattered tubercles just appearing.

RESULT :

General dissemination of tubercle.

The tests of this case are rather interesting. While some of them point to a human infection, the inoculation test, which alone is absolute, points to a bovine infection.

EXPERIMENT NO. 33

D. A. $\frac{15}{12}$ years.

HISTORY :

Three months ago it was noticed that the right knee was becoming swollen. At first there was no pain. The knee-joint then became stiff and tended to acquire a flexed position. There was no history of trauma.

PREVIOUS HISTORY :

Breast-fed until eight months old, and then /

then brought up on the bottle. Milk obtained directly from a farm.

FAMILY HISTORY :

Mother died of consumption.

April 27th :

An operation was performed. There was found to be a free synovial tubercle with some ulceration of the cartilage. A portion of the diseased membrane was inoculated into a gionea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
April 27.	437 gm.	Operation
May 2.	400 gm.	No change.
May 15.	500 gm.	Gaining weight.
May 30.	512 gm.	Still gaining ; enlarged glands.
June 5.	560 gm.	Still gaining.
June 12.	600 gm.	Glands much larger and softer.
June 20.	630 gm.	Still gaining weight.
June 24.	637 gm.	Animal killed and examined.

POST-MORTEM EXAMINATION :

There is marked tuberculosis of the groin glands /

glands on the left side.

THORAX :

There are a number of tubercles in both lungs. The peri-bronchial glands are not diseased.

ABDOMEN :

The spleen is enlarged and generally tuberculous. The liver also contains a number of small caseating tubercles.

Cultures were made from all the possible available sources.

TESTS :

A. APPEARANCE of ORIGINAL CULTURES :

Original cultures grew slowly, in isolated little masses. No luxuriance of growth.

Character resembling a bovine bacillus.

B. MORPHOLOGICAL CHARACTER :

Quite the smallest and shortest bacillus I have ever seen.

Stains quite readily. No appearance of nodular staining.

Character resembling a bovine bacillus.

C. SPECIAL CULTURE TEST :

Aug. 29th, 1911 : Primary sub-cultures were /

were made upon ordinary egg and glycerine egg. Both tubes are growing. The egg cultures show the typical ground-glass appearance. The glycerine tubes are not growing as well as the egg tubes.

Character resembling a bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Nov. 4.11	2300 gm.	Inoculated.
Nov.10.11	2200 gm.	Pneumonia.
Nov.20.11	2200 gm.	
Nov.30.11	1750 gm.	Losing weight.
	Animal died Dec. 3rd, 1911.	

There would appear to be in this case a considerable loss of weight, but this loss in weight really began when the animal developed pneumonia.

POST-MORTEM EXAMINATION :

There is no involvement of the superficial lymph glands.

THORAX /

THORAX :

The lungs readily collapse, except the left lower lobe, which is considerably consolidated. In the lower lobes of both lungs there are some tubercles. They are epithelcid in type, and show practically no evidence of caseation.

The upper lobes of both lungs are practically free.

The peri-bronchial glands are not involved.

ABDOMEN :

There is no evidence of tubercle in either liver, spleen or kidneys.

Character of the human bacillus.

The tests employed in this case illustrate the variability of the cultural and morphological tests, and they indicate strongly how little importance one ought to attach to them. The inoculation test is absolute, and the early death of the rabbit with apparent loss of weight was due to the development of a co-incident pneumonia.

RESULT :

The tests employed show that the disease is due to the human bacillus.

EXPERIMENT /

EXPERIMENT NO 34

A. D. : 7 years.

HISTORY :

Patient developed a pain in her right hip about four months ago. She was examined and X-rayed, but no disease was found. She, however, continued to limp. An abscess then formed in the outer part of the thigh. An X-ray showed tuberculous disease of the ilium.

PREVIOUS HISTORY :

Breast-fed, but has also had a considerable amount of cows' milk. The child has had the usual juvenile illnesses - measles, whooping-cough, etc.

FAMILY HISTORY :

There is no history of tubercle in the family.

May 1st. The child was operated upon. Some of the diseased material was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
May 1.11	327 gm.	Operation
May 7.11	330 gm.	No change.
May.14.11	300 gm.	Losing weight.
May.17.11	280 gm.	" "
May.20.11	260 gm.	Animal died.

POST-MORTEM /

POST-MORTEM EXAMINATION :

The original material was introduced intra-peritoneally.

The superficial glands were not diseased.

THORAX :

Both lungs contained a number of small caseous tubercles. The peri-bronchial glands were healthy.

ABDOMEN :

The spleen was markedly involved with tubercles. The retro-peritoneal glands were also markedly diseased.

Cultures were made from all the infected tissues.

TESTS :

A. CHARACTER of ORIGINAL CULTURES :

With one exception all the tubes grew very slowly. One tube showed a fairly profuse growth.

Character in keeping with the bovine bacillus.

B. MORPHOLOGICAL CHARACTER

A long thin bacillus, of the type usually associated with the human organism. It shows /

shows very distinct nodular staining.

Character in keeping with the human bacillus. Importance must not be attached to that, however, as the film was not made from the original culture.

B. SPECIAL CULTURE TESTS :

Both gylcerine egg and ordinary egg. Inoculated Aug. 29th, and examined Oct. 29th. Grew equally poorly. If anything poorer on glycerine than upon ordinary egg.

Character in keeping with the bovine bacillus.

D. INOCULATION TEST

Rabbit inoculated with .01 of tubercle.

PROGRESS :

Date	Weight	State
Nov. 20.11	2550 gm.	Inoculated.
Nov.30.11	2350 gm.	
Dec. 5.11	2400 gm.	
Dec.10.11	2320 gm.	Weight falling.
Dec.15.11	2350 gm.	
Dec.20.11	2200 gm.	
Dec.25.11	2000 gm.	Weight falling.
Dec.30.11	1980 gm.	
Jan. 5.12.	1900 gm.	Died.

POST-MORTEM /

POST-MORTEM EXAMINATION :

There is no involvement of the superficial glands and lymphatics.

THORAX :

Both lungs are simply solid with rapidly caseating tubercles.

The peri-bronchial glands are also diseased.

ABDOMEN :

The spleen is enlarged and tuberculous. Both kidneys contain a number of small casecus tubercles. The liver is also riddled with tubercles.

RESULT :

Dissemination of acute tubercle.

The tests employed in this case show that one is dealing with a bacillus of the bovine type.

EXPERIMENT NO.35

M. D. : three years.

HISTORY :

Two months ago the child developed abscesses in the left groin and in the pre-auricular gland. Three weeks later an abscess /

abscess formed upon the outer side of the ankle, proceeding from disease of the os calcis.

PREVIOUS HISTORY :

The child was breast-fed until ten months old. Afterwards it was brought up upon cows' milk. Some time ago Mr Carmichael removed tuberculous glands from the neck.

FAMILY HISTORY :

No history of tubercle in the family. Parents are both alive and well.

May 9th :

The child was admitted to Hospital and a quantity of tubercle removed from the interior of the os Calcis. A guinea-pig was inoculated from the diseased material.

PROGRESS of GUINEA-PIG :

Date	Weight	State
May 9.11.	500 gm.	Operation.
May 12.11	512 gm.	No change
May 15.11	486 gm.	No change.
May 20.11	450 gm.	Died.

POST-MORTEM EXAMINATION :

The groin and the axillary glands are infected with tubercles.

THORAX /

THORAX :

Both lungs contain a number of small follicles, largely caseating ones.

ABDOMEN :

The spleen is enlarged and tuberculous. The liver contains a number of tubercles. The retro-peritoneal glands are tuberculous.

Cultures were made from all the available sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURES :

The original cultures grew with great difficulty. Usual faint, spreading growth. Not the slightest trace of any tendency towards piling up.

Character of the bovine bacillus.

B. MORPHOLOGICAL CHARACTERS :

Long thin bacilli, like the form associated with the human type.

Show distinct nodular staining.

Character of the human bacillus.

C. SPECIAL CULTURE TEST :

Of the special cultures made upon Aug. 29th : the glycerine egg tubes have grown slightly /

slightly more luxuriantly than the ordinary egg, but the difference is slight.

Character doubtful.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Nov. 7.11	1200 gm.	Operation.
Nov.20.11	1100 gm.	
Nov.30.11	950 gm.	Loss in weight.
Dec. 5.11	1000 gm.	
Dec.10.11	1100 gm.	
Dec.18.11	1150 gm.	Gaining weight.
Dec.20.11	1000 gm.	Losing.
Dec.25.11	980 gm.	
Dec.30.11	900 gm.	
Jan. 2.12	900 gm.	Died.

POST-MORTEM EXAMINATION :

The superficial glands and lymphatics are healthy.

THORAX :

Both lungs are solid with rapidly caseating tubercles.

The /

The peri-bronchial glands are diseased.

ABDOMEN :

The spleen is enlarged and infiltrated with tubercles.

The liver contains numerous foci.

Both kidneys are markedly infected.

RESULT :

Acute dissemination of tubercles.

The tests employed in this case show that one is dealing with a bacillus of the bovine type.

EXPERIMENT NO. 36

D. D. 1 5/12 years.

HISTORY :

Six months ago patient's left ankle became swollen. There was no pain, but about two months later pain began in the part. An abscess eventually formed and burst. Tuberculous disease of the joint was diagnosed.

PREVIOUS HISTORY :

Patient was brought up on the breast. Other illnesses have been measles and whooping-cough.

FAMILY /

FAMILY HISTORY :

Patient's mother has a weak chest.

No actual history of tubercle.

May 9th :

Patient was admitted to Hospital upon May 9th, and the joint excised. Some of the diseased stuff was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
May 9.11	416 gm.	Operation.
May 15.11	400 gm.	
May 20.11		Animal died.

POST-MORTEM EXAMINATION :

A tuberculous nodule has developed at the site of inoculation. The groin and axillary glands are diseased.

THORAX :

Both lungs are riddled with tubercles. The peri-bronchial glands are infected.

ABDOMEN :

The spleen is enlarged and tuberculous. The liver is riddled with follicles. The retro-peritoneal glands are diseased.

Cultures are made from all the possible scurces.

TESTS /

TESTS :

A. CHARACTER of ORIGINAL CULTURES :

The original cultures grew varyingly ; some tubes grew with difficulty, others grew somewhat more readily in small isolated masses. None grew with any degree of luxuriance.

Character doubtful.

B. MORPHOLOGICAL CHARACTERS :

Short bacilli tend to become arranged in chains. Some are longer.

No appearance of nodular staining.

Character doubtful.

C. SPECIAL CULTURE TESTS :

Aug. 29th, 1911 : Special cultures were made upon ordinary egg and upon glycerine egg.

Oct. 30th, 1911 : Both tubes have grown, but by no means luxuriantly. The growth on glycerine has not been quite so good as that upon egg.

Character doubtful.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacillus.

PROGRESS /

PROGRESS :

Date	Weight	State
Nov. 8.11	1550 gm.	Operation.
Nov.20.11	1480 gm.	
Nov.30.11	1550 gm.	No change.
Dec. 5.11	1550 gm.	
Dec.10.11	1600 gm.	
Dec.15.11	1720 gm	Gain in weight.
Dec.16.11	1600 gm.	

POST-MORTEM EXAMINATION : Dec. 16th, 1911.

No loss in weight. Good amount of sub-cutaneous fat.

No enlargement or involvement of the sub-cutaneous lymph glands.

THORAX :

Both lungs collapse easily and readily. They are healthy, with the exception of two small epithelcid and slightly caseating follicles at the base of the left lung.

Peri-bronchial glands are not involved.

ABDOMEN :

No involvement of spleen.

No tubercle in either kidney.

No tubercle in liver or any other abdominal /

abdominal organ.

RESULT :

Chronic retrogressive tubercle.

The tests employed show that one is dealing with a bacillus of the human type.

EXPERIMENT NO. 37

J. G. : twelve years.

HISTORY :

Nine months ago a swelling appeared beneath the left eye. It formed an abscess which burst and discharged.

The condition was one of tuberculous disease of the malar bone.

PREVIOUS HISTORY :

The child was breast-fed. He never had cows' milk. He is suffering from pulmonary tuberculosis and had cervical tuberculous glands removed two years ago.

FAMILY HISTORY :

Father and mother are healthy.

May /

May 9th. :

The child underwent an operation and had the diseased malar excised. A portion was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
May 9.11	560 gm.	Operation.
May 14.11	500 gm.	
May 20.11	582 gm.	Glands.
May 28.11	560 gm.	No change.
June.1.11	500 gm.	Losing weight.
June 3.11	482 gm.	Still losing.
June 5.11	460 gm.	Animal killed and examined.

POST-MORTEM EXAMINATION :

The glands in both groins are enlarged and tuberculous.

THORAX :

Both lungs contain a number of tubercles.

ABDOMEN :

The spleen is tuberculous. There are tubercles also in the liver and in the retroperitoneal glands.

Cultures were made from all the available sources.

TESTS /

TESTS :

A. CHARACTERS of ORIGINAL CULTURES :

Culture grew very slowly, in the bovine manner. Dull spreading appearance.

Characters of the bovine bacillus.

B. MORPHOLOGICAL CHARACTER :

Long thin bacillus. Shows distinct nodular staining. Stains quite readily.

Characters of the human bacillus.

C. SPECIAL CULTURE TESTS :

Aug. 28th, 1911 : First subcultures were made upon ordinary egg and glycerine egg.

Oct. 30th, 1911 : The growth has been very imperfect. No luxuriance on the glycerine.

Characters of the bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

Date	Weight	State
Nov. 8.11	2950 gm.	Operation.
Nov.15.11	2800 gm.	
Nov.23.11	2720 gm.	
Nov.30.11	2550 gm.	Losing weight.
Dec. 3.11	2320 gm.	
Dec. 8.11	2000 gm.	Animal died.

POST-MORTEM /

POST-MORTEM EXAMINATION :

Progressive loss in weight as shown. No involvement of the superficial lymph glands.

THORAX :

Both lungs collapse imperfectly and are simply solid with tubercles.

Peri-bronchial glands are also involved.

ABDOMEN :

Spleen is enlarged and infiltrated all through with tubercles.

Liver contains numerous small tubercles.

Both kidneys contain numerous small caseating foci :

RESULT :

General dissemination of tubercle.

Duration : four weeks.

The tests employed show that the bacillus in this case is bovine in character.

EXPERIMENT No. 38

J. R. : 1 4/12 years.

HISTORY :

The child was admitted to Hospital with a/

a multiplicity of tuberculous conditions. There was tuberculosis of the cervical glands, disease of the malar bone and of the left tibia. The conditions began two months ago and were rapidly intercurrent.

PREVIOUS HISTORY :

Breast-fed until twelve months old. Has had measles and whooping-cough.

FAMILY HISTORY :

Patient's parents are healthy. There is no history to be obtained of tubercle.

The child underwent an operation upon May 18th. The disease was removed and a portion inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
May 18.11	700 gm.	Operation.
May 25.11	720 gm.	
June 2.11	680 gm.	Glands.
June 19.11	670 gm.	
July 15.11	600 gm.	
Aug. 10.11	558 gm.	
Sept.11.11	505 gm.	Animal killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

Both groin and left axillary glands are tuberculous.

THORAX :

Both lungs are riddled with tubercle.

ABDOMEN :

The spleen and liver are tuberculous ; also the retro-peritoneal glands.

Cultures were made from all available sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURES :

Grow slowly and with some difficulty. No tendency towards foliation of the growth.

Character of the bovine bacillus.

B. MORPHOLOGICAL CHARACTERS :

Short bacilli. No nodular staining. No aberrant forms.

Character of the bovine bacillus.

C. SPECIAL CULTURES :

Did not grow well on glycerine egg. Grew by comparison better upon plain egg.

Character of the bovine bacillus.

D. /

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS :

Date	Weight	State.
Dec.19.11	1750 gm.	Inoculated.
Dec.23.11	1800 gm.	
Dec.30.11	1700 gm.	
Jan. 3.12	1640 gm.	
Jan. 9.12	1500 gm.	Animal died.

POST-MORTEM EXAMINATION :

General wasting, as shown in weight table.

No involvement of the superficial lymphatic glands.

THORAX :

Both lungs are absolutely solid with tubercle, and do not collapse.

ABDOMEN :

Tubercle in spleen.

Tubercle in liver.

Tubercle in both kidneys.

RESULT :

Acute dissemination of tubercles.

Tests show that the bacillus in this case is bovine in type.

EXPERIMENT NO. 39

J. C. : 8 years.

HISTORY :

Two months ago the child was admitted to Hospital suffering from tuberculous disease of the spine. He returned with symptoms and signs typical of hip-joint disease.

PREVIOUS HISTORY :

Breast-fed. Patient had typhoid fever in 1909, and since then has had a distended abdomen.

Tuberculous peritonitis ?

FAMILY HISTORY :

Father and mother are healthy. There is a tuberculous history in the family. One sister has suffered from tuberculous groin glands.

June 1st :

An operation was performed and the hip excised. A portion was inoculated into a guinea-pig.

PROGRESS /

PROGRESS of GUINEA-PIG :

Date	Weight	State
June 1.11	500 gm.	Operation
June 14.11	510 gm.	
June 30.11	500 gm.	
July 20.11	490 gm.	Losing weight.
Aug. 20.11	460 gm.	
Sept.13.11	442 gm.	Killed.

POST-MORTEM EXAMINATION :

The left groin and the left axillary glands are diseased.

THORAX :

Both lungs are infected with small caseating tubercles.

ABDOMEN :

The spleen is tuberculous ; also the liver. There is considerable disease in the retro-peritoneal glands.

Cultures were made from the available sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURES :

Out of the original inoculation, of eight tubes /

tubes only one grew at all well, and it grew in quite a profuse growth over the surface, beginning in isolated colonies, and these amalgamating covered the media.

Character doubtful (human).

B. MORPHOLOGICAL CHARACTER :

An extremely short bacillus, rather squat.

Stains quite equally.

No sign of nodular staining.

Character of the bovine bacillus.

C. SPECIAL CULTURE TEST :

Oct. 30th, 1911 :

Two egg tubes and two glycerine inoculated.

Nov. 24th, 1911 :

Growing much more prolifically upon glycerine than upon ordinary egg.

Character of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm of tubercle.

PROGRESS /

PROGRESS :

Date	Weight	State
Nov. 9.11	2150 gm.	Inoculated.
Nov.14.11	2000 gm.	
Nov.24.11	1950 gm.	
Nov.30.11	1950 gm.	
Dec. 5.11	2000 gm.	
Dec.10.11	2150 gm.	Animal examined.

POST-MORTEM EXAMINATION :

There was no evidence of tubercle beyond the presence of a few epithelioid follicles in the lungs - a retrogressive tuberculosis.

The tests show that the disease was due to a bacillus of the human type.

EXPERIMENT NO. 40

A. M. : 8/ 12 years.

HISTORY :

Eight weeks ago pain was complained of in the right arm. The elbow joint gradually became swollen and the condition passed into tuberculous disease of the elbow joint.

PREVIOUS /

PREVIOUS HISTORY :

Measles one year ago.

Breast-fed until eighteen months old.

FAMILY HISTORY :

Father and mother are well.

Family of eight, all healthy except patient.

June 1st :

The patient was admitted to Hospital and underwent an operation for excision of the joint. A portion of the diseased tissue was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
June 1.11	482 gm.	Operation.
June 10.11	480 gm.	
June 20.11	460 gm.	
June 30.11	388 gm.	
July 21.11	298 gm.	
Aug. 10.11	220 gm.	
Aug. 21.11	200 gm.	Animal died.

POST-MORTEM EXAMINATION :

There is considerable disease of the left /

left groin glands and of the left axillary glands.

THORAX :

Both lungs contain a number of small caseating tubercles. The peri-bronchial glands are healthy.

ABDOMEN :

The spleen is markedly tuberculous.

The liver is tuberculous, and also the retro-peritoneal glands.

TESTS :

A. CHARACTERS of ORIGINAL CULTURES :

Original cultures made upon Sept. 21st, Oct. 30th : most of the tubes are growing small isolated colonies.

No tendency towards piling up of the growth.

Character of the bovine bacillus.

A. MORPHOLOGICAL CHARACTERS :

Mainly short bacilli ; here and there are longer forms.

No nodular staining.

Character of the bovine bacillus.

C. /

C. SPECIAL CULTURE TEST :

Oct. 30th : Special cultures were made upon egg and glycerine egg.

Dec. 2nd : The glycerine tubes are more restricted in their growth than the plain egg tubes.

Character of the bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm of tubercle.

PROGRESS :

Date	Weight	State
Dec. 12.11	1850 gm.	Inoculated.
Dec. 18.11	1750 gm.	No change.
Dec. 23.11	1600 gm.	
Dec. 25.11	1520 gm.	
Dec. 30.11	1480 gm.	Losing weight.
Jan. 3.11	1400 gm.	Died.

POST-MORTEM EXAMINATION :

Tuberculous disease in left groin gland.

THORAX :

Both lungs collapse very imperfectly ; they /

they are simply riddled with tubercles; nearly all of them rapidly caseating.

ABDOMEN :

Spleen : enlarged and riddled with small tubercles.

Liver : likewise riddled with tiny caseating tubercles.

Both kidneys contain an immense number of caseating follicles.

RESULT :

Rapid dissemination of acute tubercle.

The tests show that the bacillus in this case is bovine in type.

EXPERIMENT NO. 41

W. S. C. : Three years.

HISTORY :

Seven months ago a limp developed, and the knee became swollen. No treatment was adopted and eventually an abscess formed and was opened. The child was admitted to Hospital for treatment.

PREVIOUS /

PREVIOUS HISTORY :

Bottle-fed child. Milk was obtained from a diary.

No other illness.

FAMILY HISTORY :

An aunt died of pulmonary tuberculosis and an uncle suffered from tuberculous disease of the knee.

June 8th :

The child was admitted to Hospital and a portion of the bone removed. Some of the disease was inoculated into guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
June 8.11	580 gm.	Operation
June 18.11	560 gm.	
June 28.11	500 gm.	Glands.
Aug. 10.11	492 gm.	Losing weight.
Aug. 20.11	485 gm.	
Aug. 30.11	460 gm.	
Sept.17.11	400 gm.	
Sept.24.11	395 gm.	Animal killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

The groin and axillary glands are tuberculous.

THORAX :

Both lungs contain a number of small caseous nodules.

ABDOMEN :

The spleen is enlarged and tuberculous. The liver contains a number of follicles. The retro-peritoneal glands are diseased.

Cultures were made from all the available sources.

TESTS :

A. CHARACTERS of ORIGINAL CULTURE :

This was made upon Sept. 24th. It grew readily upon practically all the tubes.

Small isolated points, afterwards running together and covering the medium surface completely.

Characters doubtful.

B. MORPHOLOGICAL CHARACTERS :

Bacilli are of the long type. They stain quite readily and many of them show distinct nodular staining.

Character /

Character of the human bacillus.

C. SPECIAL CULTURE TEST :

Inoculations upon glycerine egg and ordinary egg show little appreciable difference. The growth upon the plain egg is probably more profuse.

Character of the bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Nov. 8.11	1400 gm.	Operation.
Nov.14.11	1380 gm.	
Nov.22.11	1200 gm.	
Nov.30.11	1000 gm.	Losing weight.
Dec. 1.11	1000 gm.	Animal died.

POST-MORTEM EXAMINATION :

Marked general wasting.

Duration of disease : about three weeks.

No involvement of any of the superficial lymph glands.

THORAX /

THORAX :

Both lungs imperfectly collapsed, and largely solid with tubercle.

Bronchial glands are diseased.

ABDOMEN :

Liver contains numerous small foci of tubercle.

Spleen enlarged and dotted over with a multitude of tiny foci.

Both kidneys contain throughout the cortex and in the medulla a great number of small tubercles, just beginning to caseate.

A dissemination of acute tubercle.

The tests employed show that one is dealing in this case with a bacillus of the bovine type.

EXPERIMENT NO. 42

W. B. : 7 1/12 years.

HISTORY :

The child has gradually developed a swelling of the left lower jaw. It has been perfectly /

perfectly painless, and its tuberculous condition became recognisable upon X-ray examination.

PREVIOUS HISTORY :

Bottle-fed child. The child had some abdominal trouble when he was four years old.

FAMILY HISTORY :

Father alive and well. Mother suffers from chest disease (phthisis). One sister is an invalid from a similar condition.

June 15th :

The child was admitted to Hospital and had half of the lower jaw resected for tuberculous disease.

A portion was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State.
June 15.11	400 gm.	Operation.
June 20.11	382 gm.	
June 30.11	386 gm.	
July 10.11	400 gm.	
July 20.11	412 gm.	
Aug. 10.11	385 gm.	
Aug. 12.11	400 gm.	
Sept.10.11	380 gm.	
Oct. 1.11	380 gm.	Animal killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

There is tubercle in the left groin and axillary glands ; also a tuberculous focus in the abdominal wall.

THORAX :

Tubercle follicles in both lungs.

ABDOMEN :

There is advanced tubercle of the spleen ; also of the liver and of the retro-peritoneal glands.

Cultures were made from all available sources.

TESTS :

A. APPEARANCE of ORIGINAL CULTURE :

Original culture was rather delayed, and showed no tendency to rapid growth. It spread over the surface of the medium in rather a ground-glass appearance.

Character of the bovine bacillus.

B. MORPHOLOGICAL FEATURES :

Rather a long bacillus. Shows quite distinctly nodular staining.

No aberrant or wandering forms.

Resembles the human bacillus.

C. /

C. SPECIAL CULTURE TEST :

Subcultured on egg and glycerine egg it tended to grow rather readily upon the glycerine medium.

Resembles the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Dec.12.11	2200 gm.	Inoculated.
Dec.18.11	2200 gm.	
Dec.23.11	2100 gm.	
Dec.30.11	2200 gm.	
Jan. 3.12	2150 gm.	No change.
Jan.10.12	2170 gm.	No change.
Jan.22.12	2170 gm.	No change.
Jan.30.12	2220 gm.	
Feb. 6.12	2320 gm.	Gaining weight.
Feb.10.12	2310 gm.	
Feb.13.12	2310 gm.	No change.

POST-MORTEM EXAMINATION :

Feb. 13th, 1912 :

No loss of weight. Superficial glands are /

are not enlarged or diseased.

THORAX :

Both lungs contain a few epithelcid follicles, all in process of cure.

Peri-bronchial glands are not affected.

ABDOMEN :

No tubercle in any of the abdominal organs.

A retrogressive tuberculosis.

The tests employed in this case are sufficient to demonstrate that one is dealing with a bacillus of the human type.

EXPERIMENT NO. 43

J. F. : 1 8/12 years.

HISTORY :

Nearly two years ago stiffness was noticed in the left foot and leg. The child, however, continued walking for nearly eighteen months, and then a distinct limp developed. The hip became stiff and all the appearances of hip-joint disease appeared.

PREVIOUS /

PREVIOUS HISTORY :

Brought up on cows' milk.

Patient was a bottle-fed baby.

There is no history of any other disease.

FAMILY HISTORY :

Father and mother are healthy. Family are two ; the other child is strong and well.

June 15th :

An operation was performed, and the diseased bone removed. A portion was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
June 15.11	345 gm.	Operation.
June 30.11	360 gm.	
July 30.11	310 gm.	
Aug. 10.11	310 gm.	Glands.
Aug. 20.11	290 gm.	
Aug. 30.11	260 gm.	
Sept.24.11	210 gm.	Animal died.

POST-MORTEM EXAMINATION :

The groin and axillary glands upon both sides are infected. There is a caseating mass /

mass at the site of the original inoculation.

THORAX :

Both lungs are considerably involved with tubercle.

ABDOMEN :

The spleen is tuberculous ; also the liver.

Cultures were made from all the possible sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

Original culture was made upon Sept. 24th 1911, and upon Oct. 30th all the tubes were growing. The growth was very delicate, and there was no tendency towards piling up of the organism.

Character of the bovine bacillus.

B. MORPHOLOGY :

Rather short bacilli, slightly broader than usual. They stain readily. None of them show nodular staining.

Similar to the bovine bacillus.

C. SPECIAL CULTURE :

Oct. 30th, 1911 : The subcultures made /

made upon glycerine egg and ordinary egg.

Dec. 10th : The growth appears to be inhibited by its residence upon a glycerine soil.

Character of the bovine bacillus.

D. INOCULATION TEST

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS :

Date	Weight	State
Nov.10.11	1750 gm.	Operation.
Nov.30.11	1650 gm.	
Dec. 5.11	1700 gm.	
Dec.10.11	1680 gm.	
Dec.15.11	1620 gm.	
Dec.18.11	1650 gm.	In statu quo.
Dec.23.11	1500 gm.	
Dec.28.11	1400 gm.	Rapidly losing weight.
Jan. 5.12.	1250 gm.	Animal died.

POST-MORTEM EXAMINATION :

Tuberculosis of both groin glands.

Both lungs are riddled with rapidly caseating tubercles, and do not collapse.

Peri-bronchial /

Peri-bronchial glands are also diseased.

ABDOMEN :

Liver riddled with tiny tubercles.

Spleen enlarged and considerably diseased.

Both kidneys contain a large number of tubercles, many of them fairly big and all rapidly caseating.

RESULT :

Marked dissemination of acute tubercle.

The tests employed show that one is dealing with a bacillus of the bovine type.

EXPERIMENT NO. 44

D. S. : four years.

HISTORY :

Only three weeks ago the child was noticed to be cripple. The lameness increased and the right hip showed all the signs of tuberculous disease. The hip was put into plaster for three months, but conservative treatment was not sufficient, and an operation became necessary.

PREVIOUS /

PREVIOUS HISTORY :

Breast-fed child.

No other illness.

FAMILY HISTORY :

Father had consumption.

Mother is healthy.

One child died of marasmus.

June 14th, 1911.

An operation was performed and the hip-joint excised. A portion of the diseased synovial membrane was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
June 14.11	455 gm.	Operation.
June 24.11	460 gm.	
July 5.11	420 gm.	
July 20.11	400 gm.	
July 30.11	380 gm.	Glands.
Aug. 5.11	360 gm.	
Aug. 16.11	360 gm.	Animal died.

POST-MORTEM EXAMINATION :

There was considerable tubercle in the glands /

glands of both groins and the right axilla.

THORAX :

Both lungs were riddled with small caseous tubercles.

ABDOMEN :

The spleen was enlarged and tuberculous.

There were numerous follicles in the liver.

The retro-peritoneal glands were diseased.

Cultures were made from all the available sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

The original culture grew without great difficulty and in places almost plentifully.

Character of the human bacillus.

B. MORPHOLOGICAL CHARACTER :

Majority are long bacilli. Many of them show nodular staining.

Character of the human bacilli.

C. SPECIAL CULTURE TEST :

The growth upon glycerine egg is more prolific than that upon plain egg.

Character of the human bacillus.

D. /

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Nov. 10	1520 gm.	Inoculated.
Nov. 15	1520 gm.	
Nov. 20	1530 gm.	
Nov. 25	1510 gm.	
	1500 gm.	In statu quo.
	1520 gm.	
	1500 gm.	Examined.

POST-MORTEM EXAMINATION :

There is no involvement or enlargement of the superficial glands or lymphatics.

THORAX :

Both lungs contain a few epitheloid tubercles ; but they are healing and chronic. There is no caseation.

ABDOMEN :

There is no evidence of tubercle in any of the abdominal viscera.

A chronic retrogressive tuberculosis.

Tests /

Tests show that one is dealing in this case with a bacillus of the human type.

EXPERIMENT NO. 45

W. W. : ♂ 11/12 years.

HISTORY :

When the child was two years old, a swelling developed in the spine, and all the appearances of Potts' disease. Later a swelling appeared over the frontal bone - a tuberculous abscess secondary to the bone.

PREVIOUS HISTORY :

The child was brought up on cows' milk.

The only other illness has been otorrhoea.

FAMILY HISTORY :

No history of tubercle in the family history.

June 29th :

The abscess was opened and the underlying bone scraped. A portion was inoculated into a guinea-pig.

PROGRESS /

PROGRESS of GUINEA-PIG :

Date	Weight	State
June 29.11	504 gm.	Inoculated.
July 30.11	500 gm.	Progressive gain
Aug. 10.11	520 gm.	in weight. There
Aug. 20.11	540 gm.	is, moreover,
Aug. 30.11	589 gm.	marked evidence
Sept.10.11	600 gm.	of tubercle in
Sept.20.11	650 gm.	the shape of
Sept.25.11	654 gm.	glands, etc.

POST-MORTEM EXAMINATION : Sept. 25th, 1911.

Marked tubercle in groin glands. No general wasting : in fact, weight was gained throughout. Axillary glands were caseating.

ABDOMEN :

A few tubercles in spleen.

THORAX :

One or two small epitheloid follicles in lungs.

Cultures were made from the possible sources.

TESTS :

A. CHARACTER of the ORIGINAL CULTURE :

Original culture was made upon Sept.25th, 1911. /

1911. All the tubes inoculated grew readily. some of them within one month after inoculation having quite a profuse growth.

Character of the human bacillus.

B. MORPHOLOGICAL CHARACTERS :

Varying type of bacilli. Many of them are long and show nodular staining. Others are shorter.

Character of the human bacillus and bovine bacilli.

C. SPECIAL CULTURE TEST :

Oct. 30th, 1911 : Primary subcultures were made upon ordinary egg and upon glycerine egg.

Dec. 10th : The glycerine tubes grew more luxuriantly than the plain egg tubes.

Character of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS /

PROGRESS :

Date	Weight	State
Nov. 9.11	2400 gm.	Operation.
Nov.20.11	2350 gm.	
Nov.30.11	2300 gm.	
Dec. 4.11	2000 gm.	
Dec. 7.11	1980 gm.	
Dec.11.11	1900 gm.	Animal died.

POST-MORTEM EXAMINATION : Dec. 12th. 1911.

Considerable wasting and loss of sub-cutaneous fat.

THORAX :

Both lungs completely fill the chest. They are simply solid with tubercle.

Peri-bronchial glands also affected.

ABDOMEN :

Both kidneys are riddled with tubercle.

Liver contains a number of small caseous points.

Spleen : no macroscopic tubercle apparent.

Dissemination of acute tuberculosis.

The tests employed in this case show that one is dealing with a bacillus both of the bovine type and of the human type.

EXPERIMENT /

EXPERIMENT NO. 46

W. H. S. : two years.

HISTORY :

The child began to walk when it was eleven months old, and some weeks afterwards the right hip was found to be stiff and painful. All the symptoms of tuberculous disease of the hip-joint developed.

PREVIOUS HISTORY :

Breast-fed child, but it was also brought up on cows' milk.

Some weeks ago there was otorrhœa.

FAMILY HISTORY

No history of tubercle in the family.

Aug. 4th : An operation was performed and the hip excised. A portion of the synovial membrane was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Aug. 4.11	700 gm.	Operation.
Aug. 14.11	695 gm.	
Aug. 18.11	700 gm.	
Sept.10.11	710 gm.	
Sept.17.11	682 gm.	
Sept.20.11	680 gm.	
Sept.24.11	650 gm.	
Sept.25.11	654 gm.	Killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

There is not much general wasting. The groin and axillary glands are diseased.

THORAX :

Both lungs contain a number of small tubercles. Most of them are caseating.

The peri-bronchial glands are not diseased.

ABDOMEN :

The spleen is riddled with tubercle.

There are tubercles also in the liver.

The retro-peritoneal glands are diseased.

Cultures were made from all the possible sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

The original culture was made upon Sept. 25th, 1911, and within a month a good growth was appearing. It had, however, no tendency towards foliation.

Character /

Characters were those of the bovine bacillus.

B. MORPHOLOGICAL CHARACTER :

The bacilli were fairly uniformly long. They stained quite readily, and many of them showed nodular staining.

Characters of the human bacillus.

C. SPECIAL CULTURE TEST :

Oct. 31st, 1911 : Sub-cultures were made upon ordinary egg and upon glycerine egg.

The glycerine egg cultures were less prolific than the plain egg cultures.

Characters of the bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS /

PROGRESS :

Date	Weight	State
Nov.24.11	1840 gm.	Operation.
Nov.30.11	1700 gm.	
Dec. 5.11	1720 gm.	
Dec.12.11	1800 gm.	
Dec.18.11	1840 gm.	
Dec.24.11	1800 gm.	
Dec.30.11	1700 gm.	Gaining weight.
Jan. 3.12	1800 gm.	No change.
Jan.10.12	1410 gm.	
Jan.14.12	1400 gm.	
Jan.22.12	1300 gm.	Killed.

POST-MORTEM EXAMINATION :

There is considerable general wasting. The superficial glands and lymphatics are not diseased.

THORAX :

Both lungs are simply solid with tubercle, many of them rapidly caseating.

The peri-bronchial glands are diseased.

ABDOMEN :

The spleen is enlarged and riddled with tubercle.

The /

The liver contains a number of tubercles.

Both kidneys are markedly diseased.

There is a dissemination of acute tubercle.

The tests employed show that the bacillus in this case is bovine in type.

EXPERIMENT NO. 47

H. M. : 10 11/12 years.

HISTORY :

About fifteen months ago, patient complained of pain in the right hip. The condition was diagnosed as hip-joint disease and conservative treatment was adopted. There was no improvement ; the symptoms became more marked, and an operation was recommended.

FAMILY HISTORY :

Father has had pulmonary tuberculosis.

Mother and seven children are healthy.

PREVIOUS HISTORY :

Breast-fed. Patient has had measles.

June 29th :

The child was admitted to Hospital and the /

the joint excised.

A portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
June 29.11	504 gm.	Operation.
July 30.11	500 gm.	
Aug. 10.11	508 gm.	
Aug. 20.11	500 gm.	
Sept.15.11	492 gm.	
Sept.25.11	486 gm.	Animal killed.

POST-MORTEM EXAMINATION :

Generally well nourished.

Left groin glands greatly enlarged and caseous.

Other glands are not involved.

THORAX :

Both lungs are very slightly involved with tubercle.

Bronchial glands are not involved.

ABDOMEN :

Several nodules in spleen.

Cultures /

Cultures were made from all the available sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

The original culture grew very readily upon all the tubes.

Original culture made Sept. 25th.

The growth has a decided tendency to become profuse.

Characters of the human bacillus.

B. MORPHOLOGICAL CHARACTER :

Bacilli of varying length : some long, some short.

The longer forms show nodular staining.

Characters of the human bacillus.

C. SPECIAL CULTURE TEST :

Oct. 30th, 1911 :

Cultures were made upon ordinary egg and upon glycerine egg.

Dec. 10th :

The growth upon glycerine egg was not as profuse as that upon plain egg.

D. /

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Nov. 8.11	1720 gm.	Operation.
Nov.17.11	1700 gm.	
Nov.23.11	1620 gm.	
Nov.30.11	1550 gm.	Losing weight.
Dec. 8.11	1300 gm.	Animal died.

POST-MORTEM EXAMINATION :

Great wasting. No enlargement of the superficial glands.

THORAX :

Both lungs collapse imperfectly and both are simply riddled with tubercles, all rapidly caseating.

Peri-bronchial glands are not involved.

ABDOMEN :

Spleen enlarged and simply riddled with tubercle.

Liver riddled also with tubercle.

Both kidneys dotted with numerous small caseating foci.

The tests employed show that one is dealing with a bacillus of the bovine type. The preliminary /

preliminary tests rather pointed to the infection being human.

EXPERIMENT NO. 48

H. C. : seven years.

HISTORY :

The illness began 18 months ago with pain and stiffness in the right hip. Conservative measures were tried for some time without benefit, and an operation had to be resorted to.

PREVIOUS HISTORY :

Bottle-fed child. No precaution taken regarding the milk.

Has had measles and whooping-cough.

FAMILY HISTORY :

Parents are well ; there is no history of tubercle in the family.

Aug. 12th :

The child was admitted to Hospital and the joint excised. A portion of the synovial membrane was inoculated into a guinea-pig.

PROGRESS /

PROGRESS of GUINEA-PIG :

Date	Weight	State
Aug. 12.11	670 gm.	Operation
Aug. 20.11	650 gm.	
Aug. 30.11	680 gm.	
Sept.10.11	630 gm.	
Sept.30.11	600 gm.	
Oct. 10.11	540 gm.	
Oct. 30.11	500 gm.	
Nov. 1.11		Animal killed.

POST-MORTEM EXAMINATION :

The groin glands upon the left side are diseased and tuberculous. The left axillary glands are also diseased.

THORAX :

Both lungs contain a number of small follicles; many of them are caseating.

ABDOMEN :

The spleen is enlarged and infiltrated with tubercle.

The liver contains a number of small discrete nodules.

Both kidneys are riddled throughout with tubercle /

tubercle.

Cultures were made from all the available sources.

TESTS :

A. CHARACTER of the ORIGINAL CULTURE :

The original growth was quite prolific, growing in a piled up arrangement. Pure white colour.

Character of the human bacillus.

B. MORPHOLOGICAL CHARACTERS :

Large numbers of small short bacilli. They stain equally, and there is no suspicion of nodular staining.

Some of the bacilli are longer and actively dividing.

Character of the bovine bacillus.

C. SPECIAL CULTURE TEST :

The growth upon glycerine egg has been distinctly retarded. That upon ordinary egg is prolific : of a white colour : tends to be piled up.

Character of the bovine bacillus.

D. /

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS :

Date	Weight	State
Jan. 4.12	1950 gm.	Inoculated.
Jan.14.12	1850 gm.	
Jan.22.12	1750 gm.	Losing weight.
Jan.23.12	1600 gm.	Animal died.

POST-MORTEM EXAMINATION :

Loss of weight, as shown in chart.

ABDOMEN :

Both lungs are riddled with small caseating tubercles.

Spleen : enlarged and tuberculous.

Liver : contains large number of tubercles.

THORAX :

Both lungs are absolutely riddled with large caseating tubercles.

Glands are not involved.

RESULT :

Dissemination of acute tuberculosis.

The tests employed show that one is dealing with a bacillus of the bovine type.

EXPERIMENT /

EXPERIMENT NO. 49

3/

P. M. : 1 12 years.

HISTORY :

Until six months ago, the child was quite healthy. A swelling then appeared over the right hip, and all manner of movements became painful.

The limb gradually assumed an abnormal position and the child was admitted to Hospital.

PREVIOUS HISTORY :

Child was brought up on cows' milk.

Has previously suffered from multiple cold abscesses and otorrhoea.

FAMILY HISTORY :

Father and mother are well.

There is a family history of tubercle upon both father's and mother's sides.

Aug. 27th :

The hip was excised and a portion of the diseased tissue inoculated into a guinea-pig.

PROGRESS /

PROGRESS of GUINEA-PIG :

Date	Weight	State
Aug. 27.11	462 gm.	Operation.
Sept.10.11	468 gm.	
Sept.20.11	450 gm.	
Sept.30.11	434 gm.	
Oct. 10.11	420 gm.	
Oct. 17.11	400 gm.	
Oct. 24.11	360 gm.	
Oct. 28.11	340 gm.	
Oct. 30.11	320 gm.	Animal died.

POST-MORTEM EXAMINATION :

There was found to be tuberculosis of the groin and axillary glands.

THORAX :

Both lungs contained a number of small epithelcid tubercles.

ABDOMEN :

The spleen was tuberculous. There were tubercles in the liver and disease of the retro-peritoneal glands.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

The original ordinary egg culture grew quite readily, in fact quite profusely upon ordinary egg.

Character /

Character of the human bacillus.

B. MORPHOLOGICAL CHARACTER :

All variations of the bacillus. Some are short and some are longer. The long forms show well-marked nodular staining ; the smaller ones are equal and uniform.

Character doubtful.

C. SPECIAL CULTURE TEST :

The growth upon glycerine egg is distinctly profuse - much more so than the growth upon ordinary egg - piled up masses, white in colour.

Character of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm of tubercle bacilli.

PROGRESS :

Date	Weight	State
Jan. 5.12	2150 gm.	Inoculated.
Jan.10.12	2000 gm.	
Jan.22.12	1800 gm.	Losing weight.
Jan.26.12	1800 gm.	
Jan.29.12.	1800 gm.	Animal died.

POST-MORTEM /

POST-MORTEM EXAMINATION :

Considerable general wasting.

No involvement of the lymph glands.

THORAX :

Both lungs are simply solid with tubercle, many of the tubercles being rapidly caseating.

ABDOMEN :

Liver contains thousands of tubercles.

Spleen enlarged and riddled.

Both kidneys contain large number of tubercles.

RESULT :

An acute dissemination of tuberculosis.

The tests employed are rather ambiguous, bit it would appear that the case was infected with two distinct and different types of bacillus : a human infection, as shown by the proliferation upon glycerine medium, and a bovine infection, as shown by its toxicity for the rabbit. Morphological character bears out the same proof.

EXPERIMENT NO. 50

J. M. : five years.

HISTORY :

Three years ago the right thigh became painful /

painful and swollen. Scott's dressing was applied and an abscess formed. Eventually the knee-joint seemed to become infected, as it became painful and stiff.

PREVIOUS HISTORY :

Patient is a bottle-fed child, and no special precautions were taken regarding the milk. It had measles two years ago ; no other illness.

FAMILY HISTORY :

Father and mother are healthy. One child died of tuberculous meningitis.

Aug. 31st :

An operation was performed and the knee-joint excised. A portion was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Sept. 2.11	485 gm.	Inoculated.
Sept.12.11	500 gm.	
Sept.20.11	512 gm.	Gaining weight.
Oct. 7.11	600 gm.	
Oct. 14.11	650 gm.	
Oct. 21.11	700 gm.	
Oct. 30.11	709 gm.	
Nov. 2.11	707 gm.	Beginning to lose ; Killed.

TESTS /

TESTS :

A. CHARACTER of the ORIGINAL CULTURE :

Original culture grew slowly and without any tendency towards piling up.

Character of the bovine bacillus.

B. MORPHOLOGICAL CHARACTERS :

Upon an average the bacilli are long. Almost without exception they show nodular staining. There are also a number of shorter and thicker forms.

Character doubtful.

C. SPECIAL CHARACTERS :

Grew sluggishly on both types of media.

Characters of the bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Dec.12.11	2150 gm.	Inoculated.
Dec.18.11	2250 gm.	
Dec.23.11	2000 gm.	
Dec.30.11	1900 gm.	
Jan. 3.12	1850 gm.	Losing weight.
Jan. 7.12	1700 gm.	Animal died.

POST-MORTEM /

POST-MORTEM EXAMINATION :

General wasting, as shown in the weight's table.

THORAX :

Both lungs are solid with tubercle, and do not collapse to any degree.

ABDOMEN :

Both kidneys are full of scattered tubercle.

Liver contains large numbers of small caseating tubercles.

Spleen contains similarly large numbers of caseating follicles.

RESULT :

Dissemination of acute tubercle.

The tests employed show that the bacillus in this case is bovine in type.

EXPERIMENT NO. 51

A. D. : Four years.

HISTORY :

Sixteen months ago an abscess developed in the front of the right thigh. It was opened by the Doctor. The sinus has continued discharging /

discharging, and X-ray examination showed tuberculous disease of the shaft of the femur.

PREVIOUS HISTORY :

The child has been breast-fed. Other illnesses have been pneumonia, measles and whooping-cough.

FAMILY HISTORY :

Parents are healthy and there is no history of tuberculosis in the family.

Sept. 4th :

The child was admitted to Hospital. The bone was scraped and a portion inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Sept.14.11	614 gm.	Operation.
Sept.20.11	600 gm.	
Sept.30.11	620 gm.	
Oct. 4.11	600 gm.	
Oct. 14.11	587 gm.	Losing weight steadily.
Oct. 20.11	560 gm.	
Oct. 28.11	542 gm.	
Nov. 1.11	520 gm.	Animal killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

There is not much evidence of tuberculosis. There are enlarged and caseous glands in the right groin.

THORAX :

There are a number of early tubercles in the lungs.

ABDOMEN :

There is tuberculosis of the spleen, also of the liver.

Cultures were made from all the possible sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

Very poor culture : scarcely sufficient to provide an inoculation experiment. It grew diffusely and slowly over the surface of the medium.

Appearance is typically bovine.

B. MORPHOLOGICAL CHARACTER :

The bacilli are short and squat. They stain equally. There is no sign of nodular staining, and there are no aberrant forms.

Characters resembling a bovine bacillus.

C. /

C. SPECIAL CULTURE TEST :

Growth is equally poor upon both media. Certainly there is no stimulation by a glycerine medium.

Characters resembling a bovine bacillus.

D. INOCULATION TEST :

Speckled rabbit (No. 1.) inoculated with .01 mgms of tubercle, upon Jan. 7th. 1912.

PROGRESS :

Date	Weight	State
Jan. 7.12	1900 gm.	Inoculated.
Jan.14.12	1850 gm.	
Jan.22.12	1900 gm.	Gaining weight.
Jan.30.12	1800 gm.	
Feb. 6.12	1700 gm.	Losing weight.
Feb.10.12	1680 gm.	Still losing weight.
Feb.20.12	1520 gm.	Animal examined.

POST-MORTEM EXAMINATION :

There was considerable general wasting. There is no disease in the superficial glands or lymphatics.

THORAX :

Both lungs contain large numbers of tubercle /

tubercle follicles. The follicles are actively caseating.

The peri-bronchial glands are not diseased.

ABDOMEN :

Spleen is enlarged and riddled with tubercles.

The liver contains a large number of follicles.

Both kidneys also show a considerable number of rapidly developing foci.

There is a dissemination of acute tubercle.

The tests employed in the case show that one is dealing with a bacillus of the bovine type.

EXPERIMENT NO. 52

J. F. : 5 8/12 years.

HISTORY :

About eighteen months ago the child began to limp and to complain of pain in the right knee. The clinical features of tuberculous disease of the knee-joint developed, but /

but examination showed the primary focus to be lodged in the hip. An operation was performed for the cure of the condition.

PREVIOUS HISTORY :

Breast-fed child. Measles fifteen months ago; also whooping-cough.

FAMILY HISTORY :

There is no history of actual tubercle in the family. One sister, however, has a running ear.

Sept. 25th :

The hip was scraped and a portion of the diseased tissue inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Sept.25.11	592 gm.	Operation
Oct. 5.11	600 gm.	
Oct. 10.11	612 gm.	
Oct. 30.11	600 gm.	
Nov. 10.11	550 gm.	
Nov. 15.11	500 gm.	
Nov. 20.11	420 gm.	
Nov. 27.11	408 gm.	Animal killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

A very chronic form of tubercle.

The left groin glands are tuberculous.

THORAX :

There are numerous tubercles in both lungs. They, however, are clear and epitheloid.

ABDOMEN :

The spleen is slightly involved with tubercle.

Cultures were made from the glands and the spleen.

TESTS :

A. APPEARANCE of the ORIGINAL CULTURE :

The original culture began by growing rather languidly, but after a time it grew more profusely, with a resemblance to the character of the human bacillus.

B. MORPHOLOGICAL CHARACTER :

The bacilli are uniformly long and most of them show the appearance of nodular staining. There are no branched or aberrant forms.

Characters in keeping with the human bacillus.

C. /

C. SPECIAL CULTURE TEST :

The growth upon glycerine egg is much more profuse than that upon plain egg.

Characters in keeping with the human bacillus.

D. INOCULATION TEST :

Black rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Jan. 7.12.	1650 gm.	Inoculated.
Jan.14.12	1600 gm.	
Jan.22.12	1500 gm.	Losing weight.
Jan.30.12	1500 gm.	
Feb. 6.12	1490 gm.	Still losing.
Feb.14.12	1420 gm.	
Feb.20.12	1500 gm.	Examined.

POST-MORTEM EXAMINATION :

There is no involvement of the superficial glands or lymphatics.

THORAX :

There are several follicles in the lung, but /

but they can be counted. They are epithelcid in character and are retrogressive.

ABDOMEN :

There is no trace of tubercle in any of the abdominal viscera. There are a few scattered tubercles over the peritoneum, but they are retrogressive.

This test is sufficient to show that one is dealing with a bacillus of the human type.

EXPERIMENT NO. 53

P. M. : $3\frac{1}{2}$ years.

HISTORY :

Patient gradually developed a swelling of the great toe. When brought to Hospital, the condition was diagnosed as a tuberculous dactylitis, and the diseased toe was removed.

PREVIOUS HISTORY :

Breast-fed child. Has had the usual illnesses of measles and whooping-cough.

HAMILY HISTORY :

There is no history of tubercle to be obtained.

Oct. /

Oct. 12th :

The diseased bone was removed and a portion of the diseased tissue inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Oct.12.11	415 gm.	Operation.
Oct.20.11	420 gm.	
Oct.27.11	430 gm.	
Oct.30.11	480 gm.	
Nov.10.11	460 gm.	
Nov.14.11	420 gm.	
Nov.20.11	410 gm.	
Nov.25.11	400 gm.	
Nov.27.11	398 gm.	Killed.

POST-MORTEM EXAMINATION :

The groin glands are enlarged and tuberculous.

THORAX :

Both lungs contain a few epithelcid follicles.

ABDOMEN :

The spleen contains a few chronic tubercles.

Cultures /

Cultures were made from all the available sources.

TESTS :

A. APPEARANCE of ORIGINAL CULTURE :

Rather a scanty growth from the original source upon simple egg medium, but in places the growth tends to be foliaceous.

Characters of the human bacillus.

B. MORPHOLOGICAL CHARACTER :

Very long bacilli. They show very distinct nodular staining.

Characters of the human bacillus.

C. SPECIAL CULTURE TEST :

Cultures on glycerine egg : Nov. 27th.

Showed within three weeks a very profuse growth. Growth on ordinary medium rather scanty.

Characters of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS /

PROGRESS :

Date	Weight	State
Jan. 5.12	1950 gm.	Inoculated.
Jan.10.12	2000 gm.	
Jan.18.12	2010 gm.	
Jan.22.12	2200 gm.	
Feb. 6.12	2000 gm.	Losing weight again.
Feb.10.12.	2005 gm.	
Feb.14.12	2010 gm.	Gaining weight.

POST-MORTEM EXAMINATION :

No involvement of the superficial glands or lymphatics.

THORAX :

Lungs contain a number of small follicles. They are epithelioid in type, with here and there evidence of caseation, but they are obviously healing and chronic.

Peri-bronchial glands are not involved.

ABDOMEN :

All the abdominal organs are healthy.

No trace of tubercle.

RESULT :

Chronic retrogressive tuberculosis.

The tests employed show that one is dealing in this case with a bacillus of the human type.

EXPERIMENT /

EXPERIMENT NO. 54

R. S. : 3½ years.

HISTORY :

The child has developed tuberculous dactylitis of the right hand. The disease is supposed to have developed secondary to an injury received some weeks ago.

PREVIOUS HISTORY :

The child was brought up on the breast. Previous illnesses have been measles and whooping-cough.

FAMILY HISTORY :

History of tubercle in the family.

March 3rd :

An operation was performed and the diseased finger removed. A portion was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
March 15.11	330 gm.	Operation.
March 27.11	329 gm.	No change.
April 7.11	320 gm.	Beginning to lose flesh.
April 21.11	300 gm.	Still losing weight.
April 28.11	257 gm.	Still falling.
May 8.11	230 gm.	Animal died.

POST-MORTEM /

POST-MORTEM EXAMINATION :

Considerable general wasting.

Tuberculous left axillary glands.

Glands in abdominal wall around scar.

Retro-peritoneal glands enlarged and tuberculous.

Sternal glands also affected.

Spleen covered with tubercles of varying size.

Tubercle in lungs : also in peri-bronchial glands.

TESTS :

A. CHARACTER of the ORIGINAL CULTURE :

The organism grew without any difficulty, at first in isolated foci which became foliaceous, and these amalgamating formed a copious growth over the surface of the medium.

Characters of a human bacillus.

B. MORPHOLOGICAL CHARACTER :

The bacilli are long and slender. There is slight evidence of nodular staining.

There are no aberrant forms.

Characters of the human bacillus.

C. SPECIAL CULTURE TEST :

The culture grew readily upon both media, but /

but the growth was distinctly stimulated by its residence upon glycerine.

Characters of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle.

PROGRESS :

Date	Weight	State
Aug. 21.11	1645 gm.	Inoculated.
Aug. 28.11	1500 gm.	
Sept. 4.11	1700 gm.	
Sept.10.11	2000 gm.	
Sept.29.11	2200 gm.	
Oct. 23.11	2500 gm.	Examined.

POST MORTEM EXAMINATION :

No marked evidence of tubercle. A few follicles in both lungs.

Rabbit continued to gain weight.

A retrogressive tuberculosis.

The tests employed show that one is dealing with a bacillus of the human type.

EXPERIMENT NO.55

K. C. : Seven years.

HISTORY /

HISTORY :

Two years ago the right knee-joint was excised for tuberculous disease. Some months later the knee wound broke down and discharged pus. There was found to be a recurrent tuberculosis of the bone.

PREVIOUS HISTORY :

The child was brought up on the breast, and has had measles.

FAMILY HISTORY :

There is a family history of tubercle.

March 16th :

The child was admitted to Hospital and the bone scraped. A portion of the diseased tissue was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
March 16.11	427 gm.	Operation.
March 27.11	400 gm.	No change.
April 4.11	400 gm.	
April 14.11	396 gm.	
April 30.11	350 gm.	
May 10.11	348 gm.	Glands.
May 20.11	336 gm.	
May 31.11	323 gm.	Killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

The groin glands are tuberculous. The axillary glands are also diseased.

THORAX :

Both lungs contain a number of epitheloid tubercles.

The peri-bronchial glands are healthy.

ABDOMEN :

The spleen is enlarged and largely infected with tubercle.

The liver contains a few scattered foci.

There is considerable disease of the retro-peritoneal glands.

Cultures were made from all the available sources.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

The organism grew readily from the original inoculation and tended to grow in a piled-up arrangement.

Characters resembling the human bacillus.

B. MORPHOLOGICAL CHARACTER :

The organisms on an average are long, and many of them show nodular staining. There are no branch forms.

Characters /

Characters of the human bacillus.

C. SPECIAL CULTURE TEST :

Special cultures were made upon ordinary egg and glycerine egg media. Both grew readily, and the glycerine medium appeared specially stimulating to the growth of the organism.

Characters of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS :

Date	Weight	State
Aug. 28.11	2000 gm.	Inoculated.
Sept. 3.11	2100 gm.	
Sept.14.11	2320 gm.	
Sept.20.11	2400 gm.	
Sept.25.11	2460 gm.	Gaining weight steadily.
Oct. 7.11	2500 gm.	
Oct. 14.11	2600 gm.	
Oct. 28.11	2640 gm.	

POST MORTEM EXAMINATION :

There is no degree of general wasting. The superficial glands and lymphatics are healthy.

THORAX :

The lungs contain several clear epitheloid /

epithelioid follicles, but they are distinctly retrogressive.

ABDOMEN :

There is no evidence of tubercle in any of the abdominal viscera.

RESULT :

A retrogressive tuberculosis.

The tests employed show that the bacillus in this case is human in type.

EXPERIMENT NO. 56

J. F. : Three years.

HISTORY :

The child developed tuberculous disease of the hip nine months ago. The disease was treated and cured, but it showed itself later by the development of an abscess upon the outer side of the thigh. The abscess was opened.

PREVIOUS HISTORY :

The child was breast-fed, but it spent much of its time in a Day Nursery, where there was absolutely no precaution taken regarding the milk.

FAMILY/

FAMILY HISTORY :

There is no history of tubercle to be obtained in this family.

Oct. 12th :

Some of the diseased material was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Oct. 12.11	705 gm.	Operation.
Oct. 18.11	706 gm.	
Oct. 22.11	700 gm.	
Oct. 30.11	680 gm.	
Nov. 10.11	600 gm.	
Nov. 20.11	500 gm.	
Nov. 30.11	408 gm.	
Dec. 2.11	402 gm.	Killed.

POST-MORTEM EXAMINATION :

There is disease of the groin glands upon both sides.

THORAX :

Both lungs contain several small follicles.

ABDOMEN :

The spleen is tuberculous.

The retro-peritoneal glands are diseased and /

and caseous.

Cultures were made from all the available sources.

TESTS :

A. ORIGINAL CULTURE : CHARACTER :

The original culture grew slowly and with difficulty. It spread diffusely over the surface of the medium in a ground-glass appearance.

Character resembling the bovine bacillus.

B. MORPHOLOGICAL CHARACTER :

Very short bacilli, typically bovine in appearance.

No sign of nodular staining.

C. SPECIAL CULTURE TEST :

Inoculation upon a glycerine medium does not produce any excessive growth.

Characters of the bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle /

tubercle bacilli.

PROGRESS :

Date	Weight	State
Jan.13.12	1950 gm.	Inoculated.
Jan.22.12	2170 gm.	
Jan.28.12	2000 gm.	
Jan.31.12	1900 gm.	Losing weight.
Feb. 7.12	1850 gm.	
Feb.12.12	1840 gm.	
Feb.14.12	1830 gm.	
Feb.24.12	1820 gm.	Animal died.

POST-MORTEM EXAMINATION :

There was considerable general wasting.

The superficial glands and lymphatics were not diseased.

THORAX :

Both lungs contained an enormous number of rapidly caseating tubercles. So advanced was the disease that the lungs could not properly collapse.

The peri-bronchial glands are healthy.

ABDOMEN :

The spleen is dotted all over with small caseating tubercles.

The /

The liver contains a number of small follicles.

There are numerous tubercles in both kidneys.

A dissemination of acute tuberculosis.

The tests employed show that one is dealing in this case with a bacillus of the bovine type.

EXPERIMENT NO. 57

R. F. : Five years.

HISTORY :

Sixteen months ago pain was complained of in the right ankle. The joint became swollen and very soon all the characters of tuberculous disease of the joint developed.

PREVIOUS HISTORY :

The child was brought up on the breast. Other illnesses have been measles and scarlet fever.

FAMILY HISTORY :

There is a strong history of tubercle upon the father's side, and one sister has got a cough and a weak chest.

Oct. /

Oct. 26th :

The ankle joint was excised and a portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Oct.26.11	320 gm.	Operation.
Oct.30.11	318 gm.	
Nov.10.11	300 gm.	
Nov.20.11	320 gm.	
Nov.30.11	317 gm.	Tuberculous gland in groin.
Dec. 5.11	322 gm.	
Dec.15.11	320 gm.	Holding its own.
Dec.22.11	321 gm.	Animal killed.

POST-MORTEM EXAMINATION :

Marked involvement of left and right groin glands. Retro-peritoneal glands are tuberculous.

Spleen is enlarged and riddled with caseating tubercles.

Liver contains a number of tubercles.

Tubercle also in lungs.

Rather a chronic infection.

Cultures were made from all the available sources /

scurces.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

Culture grew very slowly upon ordinary egg medium, showing the character of the bovine bacillus.

B. MORPHOLOGICAL CHARACTER :

Small organisms.

One or two longer forms.

No nodular staining.

Characters doubtful.

C. SPECIAL CULTURE TEST :

Two glycerine tubes inoculated Jan.13.12.

Two plain " " Jan.13.12.

The growth upon glycerine medium is stimulated by the presence of the glycerine.

Characters of the human bacillus.

D. INOCULATION TEST :

Inoculation of rabbit with .01 mgm. of tubercle bacilli.

PROGRESS /

PROGRESS :

Date	Weight	State
Jan.13.12	2100 gm.	Inoculated.
Jan.22.12	2000 gm.	
Jan.30.12	2010 gm.	
Feb. 6.12	2000 gm.	In statu quo.
Feb.10.12	2020 gm.	
Feb.14.12	2030 gm.	
Feb.30.12	2028 gm.	Gaining weight.
Feb.25.12.	2040 gm.	Animal examined.

POST MORTEM EXAMINATION :

There is no degree of general wasting.

The superficial glands and lymphatics are not diseased.

THORAX :

There are a few epitheloid follicles in both lungs, but they are rapidly healing.

The peri-bronchial glands are healthy.

ABDOMEN :

The abdominal organs show no evidence of tubercle.

A retrogressive tuberculosis.

The tests employed in this case show that one /

one is dealing with a bacillus of the human type.

EXPERIMENT NO. 58

B. S. C. : Five years.

HISTORY :

The child was admitted to Hospital suffering from tuberculous disease of the lower end of the left femur. It had developed secondary to an accident received some months before.

PREVIOUS HISTORY :

The child was breast-fed.

There was no history of any previous illness.

FAMILY HISTORY :

There is no definite family history of tubercle. Both the parents are healthy.

Oct. 26th :

The diseased bone was scraped and a portion inoculated into a guinea-pig.

PROGRESS /

PROGRESS of GUINEA-PIG :

Date	Weight	State
Oct.26.11	295 gm.	Operation.
Oct.30.11	298 gm.	
Nov.10.11	300 gm.	
Nov.20.11	250 gm.	
Nov.30.11	292 gm.	
Dec. 5.11	260 gm.	
Dec.14.11	242 gm.	Losing weight.
Dec.22.11	229 gm.	Animal killed.

POST-MORTEM EXAMINATION :

The glands in the groin are diseased.

THORAX :

Both lungs contain a number of small caseating tubercles.

ABDOMEN :

The spleen is tuberculous.

There are a few scattered follicles in the liver. The retro-peritoneal glands are diseased.

TESTS :

A. CHARACTER of the ORIGINAL CULTURE :

The original cultures grew quite vigorously, and they tended to form piled-up masses upon the surface of the medium.

Characters /

Characters of the human bacillus.

B. MORPHOLOGICAL CHARACTER :

Long bacilli are in the majority. There are a few shorter organisms.

Nodular staining is quite marked.

Characters of the human bacillus.

C. SPECIAL CULTURE TEST :

Two glycerine tubes inoculated Jan.13.12.

Two plain " " Jan.13.12.

Inoculation of the glycerine tubes produced an exaggerated growth.

Characters of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli.

PROGRESS :

Date	Weight	State
Jan.13.12.	2550 gm.	Inoculated.
Jan.22.12	2600 gm.	
Jan.30.12	2600 gm.	
Feb. 6.12	2600 gm.	No change.
Feb.12.12	2600 gm.	
Feb.16.12	2720 gm.	
Feb.20.12	2800 gm.	Gaining weight.
Feb.24.12	2750 gm.	
Feb.28.11	2800 gm.	Animal examined.

POST-MORTEM /

POST-MORTEM EXAMINATION :

The superficial glands and lymphatics are not diseased.

There is no degree of general wasting.

THORAX :

There are a few healing tubercles in both lungs.

The peri-bronchial glands are not diseased.

ABDOMEN :

There is no evidence of tubercle in any of the abdominal viscera.

The tests employed show that one is dealing with a bacillus of the human type.

EXPERIMENT NO. 59

J. R. : Four years.

HISTORY :

When the child was one year old, it developed some degree of stiffness in the right hip. For three years the condition went on and gradually became worse, until it developed all the typical clinical features of hip-joint disease.

PREVIOUS /

PREVIOUS HISTORY :

The child was breast-fed until it was eight months old, and after that date it was brought up upon cows' milk.

There had been no other illness.

FAMILY HISTORY :

The parents are healthy and there is no history of tubercle in the family.

November 17th :

An operation was performed and the head of the femur excised. A portion of the diseased tissue was inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Nov.17.11	392 gm.	Inoculated.
Nov.20.11	398 gm.	
Nov.25.11	390 gm.	
Nov.30.11	326 gm.	
Dec. 3.11	300 gm.	
Dec. 7.11	298 gm.	
Dec.11.11	575 gm.	Examined.

POST MORTEM EXAMINATION : Dec. 11th, 1911 :

Not much dissemination of tubercle.

The groin glands upon both sides are enlarged /

enlarged and tuberculous.

The spleen is enlarged and contains a number of tubercles.

The other body organs show no sign of tuberculous disease.

Cultures were made from the different tissues.

TESTS :

A. CHARACTER of ORIGINAL CULTURE :

The original cultures grew slowly and gradually. There was no tendency towards foliation and one connected the characters of the cultures with those produced by the bovine bacillus.

B. MORPHOLOGICAL CHARACTER :

Very short squat bacilli. Stained readily but very slightly with fuchsin.

Show no nodular staining.

Characters of the bovine bacillus.

C. SPECIAL CULTURE TEST :

Two glycerine egg tubes inoculated Jan.13, 1911.

Two plain " " " "

Inoculation /

Inoculation of the glycerine tubes does not produce any increased activity of growth.

Characters of the bovine bacillus.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle bacilli : Jan. 13th, 1911.

PROGRESS :

Date	Weight	State.
Jan.13.12	2500 gm.	Inoculated.
Jan.22.12	2450 gm.	
Jan.30.12	3480 gm.	
Feb. 6.12	2500 gm.	
Feb.12.12	2380 gm.	
Feb.17.12	2320 gm.	Losing weight.
Feb.22.12	2300 gm.	Examined.

POST MORTEM EXAMINATION :

There is some degree of wasting. The superficial glands and lymphatics are not diseased.

THORAX :

Both lungs contain an enormous number of rapidly caseating tubercles. The lungs are so greatly affected that they do not properly collapse.

The /

The peri-bronchial glands are diseased.

ABDOMEN :

The spleen shows no macroscopic evidence of tubercle.

The liver contains a large number of caseating follicles.

Both kidneys are considerably infected with disease.

An acute dissemination of tubercle.

The tests employed show that one is dealing with a bacillus of the bovine type.

EXPERIMENT NO. 60

E. F. : Thirty years.

HISTORY :

The patient has suffered from multiple osseous tubercle. It has affected the phalanges and the metacarpal bones. The disease in one phalanx was sufficiently severe as to necessitate amputation.

PREVIOUS HISTORY :

Patient has been healthy. A breast-fed child.

FAMILY /

FAMILY HISTORY :

There is a strong family history of tubercle.

August, 14th :

The phalanx was removed and a portion of the diseased bone inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Aug. 14.11	492 gm.	Inoculated.
Sept. 1.11	500 gm.	
Sept.10.11	420 gm.	
Sept.20.11	475 gm.	No change.
Sept.30.11	440 gm.	Enlarged glands in groin.
Oct. 10.11	420 gm.	
Oct. 20.11	400 gm.	Animal examined.

POST-MORTEM EXAMINATION :

There was very considerable disease in the groin glands upon both sides.

There were a few epitheloid nodules in the lungs.

The spleen was enlarged and tuberculous.

Cultures were made from all the available sources.

TESTS /

TESTS :

A. CHARACTERS of the ORIGINAL CULTURE :

The original culture grew rather slowly, quite uniformly spreading over the surface of the medium in a ground-glass appearance.

B. MORPHOLOGICAL CHARACTERS :

Rather short squat bacilli.

All stain readily and equally.

There is no appearance of nodular staining.

Resembles the bovine variety.

C. SPECIAL CULTURE TEST :

It grew most luxuriantly upon glycerine egg.

Sub-cultures : Nov. 30th.

Dec. 30th, showed a prolific growth of a distinctly pink colour.

Character of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated intravenously with .01 mgm. of tubercle.

PROGRESS /

PROGRESS :

Date	Weight	State
Jan.14.12	2300 gm.	Inoculated.
Jan.10.12	2300 gm.	
Jan.18.12	2320 gm.	
Jan.27.12	2380 gm.	
Feb. 6.12	2400 gm.	Gaining weight.
Feb.10.12	2280 gm.	
Feb.14.12	2300 gm.	Animal examined.

POST-MORTEM EXAMINATION :

No loss of weight.

Superficial glands are not enlarged.

No evidence of tubercle.

THORAX :

Both lungs contain a number of epitheloid tubercle, especially at the apices. They are translucent without any sign of caseation.

Peri-bronchial glands are not enlarged.

ABDOMEN :

Liver and spleen healthy. No sign of tubercle in the kidneys.

RESULT :

Chronic retrogressive tuberculosis.

The tests employed show that one is dealing with a bacillus of the human type.

EXPERIMENT /

EXPERIMENT NO. 61

N. C. : years.

HISTORY :

There was considerable disease in the cervical glands of the left side. At operation, when the glands were removed, there was found to be some disease of the axis vertebrae.

PREVIOUS HISTORY :

Patient was breast-fed. There have been the usual diseases of childhood : measles and scarlet fever.

FAMILY HISTORY :

There is no history of tubercle.

Oct. 26th :

A guinea-pig was inoculated with a portion of the diseased bone.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Oct.26.11	575 gm.	Inoculated.
Oct.30.11	580 gm.	
Nov.10.11	590 gm.	
Nov.20.11	600 gm.	
Nov.30.11	610 gm.	
Dec. 5.11	618 gm.	
Dec.14.11	612 gm.	Small swelling in left groin. Animal killed.

POST-MORTEM /

POST-MORTEM EXAMINATION :

The only superficial evidence of tubercle consists in the presence of a few caseating glands in the left groin.

THORAX :

Both lungs contain a few epitheloid tubercles. No caseation.

ABDOMEN :

Spleen is simply a mass of large epithelioid tubercles. No caseation.

RESULT :

Very chronic tubercle : two months duration : most probably human.

Cultures were made from the affected tissues.

TESTS :

A. CHARACTERS of the ORIGINAL CULTURE :

The original culture grew quite readily. It tended to form foliaceous masses upon the surface of the medium.

Characters of the human bacillus.

B. MORPHOLOGICAL CHARACTERS :

The bacilli varied considerably in size and shape. Many of them were short, but the majority /

majority were long and stained irregularly..

Characters of human or bovine bacilli.

C. SPECIAL CULTURE TEST :

Glycerine egg and plain egg tubes were inoculated upon Jan. 13th.

The glycerine tubes showed a more profuse growth as compared with the plain egg tubes.

D. INOCULATION TEST :

Rabbit inoculated with .01 mgm. of tubercle, Jan. 13th, 1912.

PROGRESS :

Date	Weight	State
Jan.13.12	2450 gm.	Inoculated.
Jan.22.12	2400 gm.	
Jan.30.12	2400 gm.	
Feb. 6.12	2300 gm.	
Feb.10.11	2300 gm.	In statu quo.
Feb.14.12	2420 gm.	
Feb.20.12	2500 gm.	
Feb.26.12	2500 gm.	Animal examined.

There is no evidence of tubercle beyond a few healing follicles in the lungs.

A retrogressive tuberculosis.

The tests employed show that one is dealing with a bacillus of the human type.

EXPERIMENT /

EXPERIMENT NO. 62

A. C. : years.

HISTORY :

The history is that on a gradually developing swelling of the ankle-joint (right).

There are no points which require special mention.

The condition necessitated excision of the joint.

PREVIOUS HISTORY :

Breast-fed.

There has been no other illness.

FAMILY HISTORY :

There was a questionable history of tubercle in the family.

October 29th :

An operation was performed and the joint excised. A portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS /

PROGRESS of GUINEA-PIG :

Date	Weight	State
Oct.29.11	270 gm.	Operation.
Nov. 4.11	256 gm.	
Nov.11.11	279 gm.	
Nov.19.11	300 gm.	
Nov.30.11	298 gm.	
Dec.10.11	280 gm.	Beginning to lose weight.
Dec.20.11	275 gm.	

POST-MORTEM EXAMINATION :

Left groin glands are enlarged and caseating. These are the only glands affected with tubercle.

THORAX

Both lungs are riddled with small epithelioid tubercles. Peri-bronchial glands are not affected.

ABDOMEN :

Spleen enlarged and riddled with large caseating tubercles. No tubercle in liver. Retro-peritoneal glands are diseased.

Dec. 20th, 1911 :

Cultures made upon egg medium.

TESTS :

A. CHARACTERS of the ORIGINAL CULTURE :

The /

The bacillus grew readily upon ordinary egg medium. In four weeks a profuse growth.

Characters of the human bacillus.

B. MORPHOLOGICAL APPEARANCE :

Various forms, chiefly long organisms.

Show nodular staining very well.

Characters of the human bacillus.

C. SPECIAL CULTURE TEST :

Two glycerine and two ordinary tubes inoculated, Jan. 13th, 1912.

Result : The growth upon the glycerine medium was more profuse than that upon the plain medium.

Characters of the human bacillus.

D. INOCULATION TEST :

Rabbit inoculated : Jan. 1sth, 1912 : with .01 mgm. tubercle.

Date	Weight	State
Jan.13.12	2150 gm.	Inoculated.
Jan.22.12	2140 gm.	
Jan.30.12	2150 gm.	
Feb. 6.12	2150 gm.	No change.
Feb.10.11	2156 gm.	
Feb.15.12	2150 gm.	
Feb.20.12	2250 gm.	Maintaining its weight.
Feb.24.12	2200 gm.	
Feb.29.12	2200 gm.	Animal examined.

POST-MORTEM /

POST-MORTEM EXAMINATION :

There is no evidence of superficial tubercle and there is no degree of general wasting.

THORAX :

Both lungs contain a few isolated examples of epithelcid tubercles, but they are very chronic, with no caseation.

The abdominal viscera are healthy.

A retrogressive tuberculosis.

The tests employed show that one is dealing with a bacillus of the human type.

EXPERIMENT NO. 63

P. D. : Three years.

HISTORY :

Two months ago the child was supposed to have sprained the knee and soon afterwards a swelling appeared upon its inner side. An abscess developed and was opened. No disease of the bone was found.

PREVIOUS HISTORY :

The child has hitherto been always quite healthy /

healthy.

FAMILY HISTORY :

One brother has tuberculous cervical glands.

The child was breast-fed, but also had a quantity of cows' milk obtained from the neighbouring farm.

Dec. 4th :

An operation was performed and a quantity of the pus inoculated into a guinea-pig.

PROGRESS of GUINEA-PIG :

Date	Weight	State
Dec. 4.11	374 gm.	Inoculated.
Dec. 7.11	370 gm.	
Dec.10.11	362 gm.	
Dec.15.11	350 gm.	Losing weight.
Dec.18.11	340 gm.	
Dec.19.11	300 gm.	Animal died.

POST MORTEM EXAMINATION :

No involvement of the superficial glands.

Marked involvement of the mesenteric glands.

Liver and spleen simply riddled with enormous /

enormous caseating tubercles.

Very few tubercles in the lungs.

There being an extra-peritoneal infection of course explains the occurrence. A very acute tubercle, and almost certainly bovine.

TESTS :

In this case the test employed was the knee-joint test. The details have already been described.

Rabbit inoculated into right knee-joint upon Dec. 20th, 1911.

Date	Weight	State
Dec.20.11	1920 gm.	Inoculated.
Dec.27.11	1900 gm.	Joint swollen.
Jan. 2.12	1900 gm.	Painful and stiff.
Jan. 6.12	1850 gm.	Killed and examined.

EXAMINATION :

The knee-joint shows an intense reaction. The capsule is distended with fluid and caseous /

caseous material. The synovial membranes are injected and riddled with tubercle. The cartilages are beginning to show some sign of destruction.

GENERAL EXAMINATION :

There is some general wasting, and there are a few acute tubercles in the lungs and in the kidneys.

The test demonstrates that one is dealing with a bacillus of the bovine type.

EXPERIMENT/

EXPERIMENT NO.64.

J. R. 4 years.

HISTORY. Five months ago the child developed a swelling in the right thigh. An abscess formed and burst; some weeks afterwards a similar abscess appeared in the upper arm and again in the right thigh; this latter developing in relation to the former.

PREV. HISTORY. The child has had measles; in fact, the present illness developed after measles.

It has also suffered from whooping cough.

FAMILY HISTORY. There is no history of tubercle in the family. The child was brought up partly on the breast and latterly on cows' milk; there was no attempt at purification of the milk.

December 8th. An operation was performed and a quantity of the pus inoculated into a guinea pig.

PROGRESS OF GUINEA PIG.

Date.	Weight.	State.
Dec. 8	500 gms.	Inoculated.
Dec.14	492 gms.	-
Dec.20	490 gms.	-
Dec.28	428 gms.	Losing weight.
Jan. 7	460 gms.	Killed & Examined.

POST/

POST MORTEM EXAMINATION. The groin glands upon both sides were caseating.

THORAX. There were a number of caseating follicles scattered throughout both lungs.

ABDOMEN. The spleen was enlarged and tuberculous. There was a considerable amount of disease in the retro-peritoneal glands.

Cultures were made from all the available sources.

TESTS.

A. APPEARANCE OF ORIGINAL CULTURES. The original cultures upon plain egg medium grew slowly; it took the appearance of a diffuse, irregular film spreading gradually over the surface of the medium.

There was not the slightest tendency towards piling up of the growth. The characters resembled those of the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS. The Bacilli are uniformly short; they stain equally and readily, and there is no appearance of nodular staining; similar to a Bovine Bacillus.

C. SPECIAL CULTURE TEST. Inoculation of a number of Glycerine Egg tubes produced a growth which in every respect was poorer than the corresponding plain Egg tubes.

D/

D. INOCULATION TEST. Rabbit inoculated with ·01 mgm. of tubercle.

PROGRESS.

Date	Weight	State
Feb.10.	2450 gms.	Inoculated.
Feb.15.	2300 gms.	-
Feb.20.	2200 gms.	-
Feb.25.	2100 gms.	losing weight
Feb.29.	2000 gms.	-
Mar. 7.	2000 gms.	examined.

POST MORTEM EXAMINATION. There was a very considerable degree of wasting. The superficial glands were not enlarged.

THORAX. Both lungs contained a large number of rapidly caseating tubercles, the lungs did not collapse properly.

ABDOMEN. The liver contained a large number of caseating tubercles. There were also a very considerable number of caseating follicles in both kindeys. Acute disseminated tuberculosis.

The tests employed are sufficient to show that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT/

EXPERIMENT NO. 65.

R.C. 8 years.

HISTORY. The disease began four years ago by patient sustaining a kick upon the right ankle; the part was swollen and painful for some considerable time, and ultimately developed into a typical synovial tubercle of the ankle joint.

PREV.HISTORY. An attack of measles two years ago.

FAMILY HISTORY. There is a strong history of pulmonary tubercle on the Mother's side. The child was breast fed until it was about 9 months old; no precaution was taken with the cow's milk.

December 10th. An operation was performed and the ankle joint excised; a portion of the diseased syovial membrane was introduced into a guinea pig.

PROGRESS OF GUINEA PIG.

Date	Weight	State.
Dec.10.	324 gms.	Inoculated.
Dec.14.	320 gms.	-
Dec.18.	312 gms.	-
Dec.25.	300 gms.	-
Dec.30.	296 gms.	-
Jan. 8.	280 gms.	Killed & examined.

POST/

POST MORTEM EXAMINATION. The groin glands upon both sides are caseating; the left axillary glands are also diseased.

THORAX. Both lungs contain a number of small caseating follicles; the peri-bronchial glands are diseased.

ABDOMEN. The spleen is enlarged and tuberculous. There is considerable disease in the retro-peritoneal glands.

Cultures were made from all the available sources upon Egg medium.

TESTS.

A. CHARACTER OF ORIGINAL CULTURE. The original culture grew with considerable rapidity and profusion; it tended to form piled-up masses upon the surface of the medium; it had the characters which one associates with the Human Bacillus.

B. MORPHOLOGICAL CHARACTERS. The Bacilli showed the characters of the Human Bacillus in so far as they were of considerable length; there was an indistinct tendency towards nodular staining.

C. SPECIAL CULTURE TEST. The organisms when implanted upon Glycerine Egg medium grew with a greater profusion than the plain Egg growth. Characters of the Human Bacillus.

D/

D. INOCULATION TEST. Rabbit inoculated with ·01 of Tubercle Bacilli.

PROGRESS OF RABBIT.

Date.	Weight.	State.
Feb. 7	2000 gms.	Inoculated.
Feb. 10	2080 gms.	-
Feb. 14	2050 gms.	-
Feb. 20	2100 gms.	No change.
Feb. 25	2120 gms.	-
Feb. 29	2100 gms.	-
Mar. 7	2100 gms.	Examined.

POST MORTEM EXAMINATION.

Careful examination showed practically nothing of the nature of tubercle. The solitary exceptionswere the lungs, they contained a few epithelioid tubercles. A chronic Retrogressive Tuberculosis.

RESULT. The tests employed show that one is dealing with a Bacillus of the Human type.

EXPERIMENT NO. 66.

C.H. 4 years.

HISTORY. Five years ago pain began to be complained of in the right hip; a limp developed, and all the symptoms of tuberculous disease of the joint developed. The child was admitted to Hospital.

PREVIOUS/

PREVIOUS HISTORY. The child has suffered from whooping-cough, measles and such childish disorders.

FAMILY HISTORY. There is no history of Tubercle in the family. There are a number of children, all healthy. The child has been brought up on cows' milk.

December 4th. The hip joint was excised and a portion of the diseased membrane inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 4	420 gms.	Inoculated.
Dec. 10	425 gms.	-
Dec. 16	420 gms.	-
Dec. 25	400 gms.	-
Dec. 30	395 gms.	-
Jan. 5	390 gms.	Examined.

POST MORTEM EXAMINATION.

There is considerable disease in the left groin glands.

THORAX. Both lungs contain a number of small tuberculous follicles.

ABDOMEN. The spleen is tuberculous; there are a number/

number of follicles in the liver. The retro-peritoneal glands are diseased.

Cultures were made from all the available sources.

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

The original culture grew very slowly and gradually; it extended diffusely over the surface of the medium in the so-called Ground Glass appearance. Characters of the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The Bacilli are short and squat, and there is no evidence of anything suggesting nodular staining. Characters of the Bovine Bacillus.

C. SPECIAL CULAURE TEST.

Inoculation of Glycerine Egg tubes does not produce any stimulation of growth. Characters of the Bovine Bacillus.

D. INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of tubercle.

PROGRESS.

Date.	Weight.	State.
Feb. 17	2400 gms.	Inoculated.
Feb. 20	2300 gms.	-
Feb. 25	2150 gms.	-
Feb. 29	2100 gms.	-
Mar. 4	2000 gms.	-
Mar. 7	2000 gms.	Animal Examined.

POST/

POST MORTEM EXAMINATION.

Some general wasting. Both lungs contain a large number of caseating tubercles. The spleen and liver are tuberculous. Both kidneys are riddled with follicles. Acute disseminated Tuberculosis.

RESULTS. The tests employed show that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT NO. 67.

D.S. 2 years.

HISTORY. Patient suffered from tuberculous disease of the Os Calcis; the condition developed four months ago. It first appeared as a painful thickening of the heel. X ray examination showed the condition.

PREVIOUS HISTORY. Until the development of the present illness, the child had been a healthy one. Chickenpox was the only intermittent disease.

FAMILY HISTORY. There is no history of Tubercle in the family. The child was nourished on the breast until it was 9 months old, it was then fed upon ordinary cows' milk.

December/

December 10th. An operation was performed, and the bone scraped. A portion was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 10	308 gms.	Inoculated.
Dec. 15	300 gms.	-
Dec. 20	296 gms.	-
Dec. 23	287 gms.	-
De c. 29	268 gms.	-
Jan. 2	260 gms.	Animal Examined.

POST MORTEM EXAMINATION.

There was considerable caseating disease in the abdominal wall. The groin glands upon both sides were tuberculous.

THORAX. Tubercles in lungs and in peribronchial glands.

ABDOMEN. The spleen was enlarged and tuberculous. There was considerable disease also of the liver.

Cultures were made from all the available sources upon Egg Medium (Dorset).

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

The original culture grew with the characteristics one usually ascribes to the Bovine Bacillus;/

Bacillus; it extended slowly in a thin film over the surface of the medium.

B. MORPHOLOGICAL CHARACTERS.

Short Bacilli, staining readily and equally. There were no branched or aberrant forms. No nodular staining. Characters of the Bovine Bacillus.

C. SPECIAL CULTURE TEST.

Inoculation of Glycerine Egg tubes does not produce any excess of growth, in fact the growth is rather retarded thereby.

D. INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of tubercle.

PROGRESS.

Date.	Weight.	State.
Feb. 10	1200 gms.	Inoculated.
Feb. 15	1205 gms.	-
Feb. 18	1890 gms.	-
Feb. 25	1850 gms.	-
Feb. 28	1800 gms.	-
Mar. 8	1800 gms.	-

POST MORTEM EXAMINATION.

There was considerable general wasting. The superficial glands and lymphatics were not diseased.

THORAX.

THORAX. Both lungs contained great numbers of caseating tubercles. The peribronchial glands were healthy.

ABDOMEN. The spleen was riddled with tubercles, also the liver and both kidneys. Acute disseminated Tuberculosis.

RESULTS. The tests employed show that one is dealing with a Bacillus of the Human type.

EXPERIMENT NO. 68.

W.B. 8 years.

HISTORY. Four months ago the child began to complain of pain in the right hip. A limp developed, and the joint became stiff, while the limb took up a permanent flexed position. The signs are recognized as those of a tuberculous hip.

PREVIOUS HISTORY. The child had previously suffered from measles and whooping-cough.

FAMILY HISTORY. The family history contains no trace of anything of a tuberculous nature. The child when a baby was brought up on the breast, later it was nourished upon unsterilized milk.

December 7th. An operation was performed, and the hip excised. A portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 7	480 gms.	Inoculated.
Dec. 10	482 gms.	-
Dec. 14	460 gms.	-
Dec. 20	458 gms.	-
Dec. 25	430 gms.	-
Dec. 30	400 gms.	-
Jan. 5	398 gms.	Examined.

POST MORTEM EXAMINATION.

Disease of the left groin glands; much enlarged and caseating.

THORAX. There are, as usual, a number of small caseating points, more especially at the bases of both lungs.

ABDOMEN. The spleen is tuberculous, also the liver and the retro-peritoneal glands.

Cultures were made from all the available sources.

TESTS. A. APPEARANCE OF THE ORIGINAL CULTURE.

The original culture grew slowly and gradually over the surface of the medium; it did not show any tendency towards foliation or piling up of the growth. Characters of the/

the Bovine Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The Bacilli were uniformly short, none of them show nodular staining, and they possess all the appearances of Bovine Bacilli.

C. SPECIAL CULTURE TEST.

Inoculation of Glycerine Egg tubes did not produce any stimulation of growth. Characters of the Bovine Bacillus.

INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS OF RABBIT.

Date.	Weight.	State.
Feb. 3	1760 gms.	Inoculated.
Feb. 8	1700 gms.	-
Feb. 14	1620 gms.	-
Feb. 20	1500 gms.	Losing weight.
Feb. 29	1490 gms.	-
Mar. 7	1420 gms.	Examined.

POST MORTEM EXAMINATION.

There is an acute disseminated tubercle. The superficial glands are healthy.

THORAX. Both lungs nearly fill the thorax; they do not collapse properly, and they are riddled with/

with caseating tubercles.

ABDOMEN. There are numerous tubercles in the spleen, liver and both kidneys.

RESULTS. The tests employed show that one is dealing with a Bacillus of the Bovine type.

EXPERIMENT NO. 69.

T.F. 4 years.

HISTORY. The child was admitted, suffering from tuberculous disease of the hip joint. The illness had begun insiduously 4 months ago with pain and suffering. No history of traumatism.

PREVIOUS HISTORY. A healthy child, beyond the presence of measles and whooping-cough when two years old.

FAMILY HISTORY. There is no history of tubercle in the family. Parents are both alive and well. The child was breast fed until 8 months old.

December 10th. The child was admitted to Hospital, and the hip joint excised. A portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS/

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 10	700 gms.	Inoculated.
Dec. 20	680 gms.	-
Dec. 30	620 gms.	-
Jan. 3	600 gms.	-
Jan. 8	598 gms.	Examined.

POST MORTEM EXAMINATION.

Tuberculous groin glands, rapidly caseating.

THORAX. Both lungs contained a considerable number of tubercles.

ABDOMEN. The spleen was tuberculous, also the liver and the deep abdominal glands.

Cultures were made from all the available sources.

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

The original culture grew freely, and in a very short time it tended to a foliaceous growth over the surface of the medium. Characters of the Human Bacillus.

B. MORPHOLOGICAL CHARACTERS.

The majority of the Bacilli are long and slender. Some of them show distinct nodular staining./

staining. Characters of the Human Bacillus.

C. SPECIAL CULTURE TEST.

The inoculation of Glycerine Egg tubes produces a luxurious growth, even more so than the growth upon Plain Egg Medium. Characters of the Human Bacillus.

D. INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS.

Date.	Weight.	State.
Feb. 4	2020 gms.	Inoculated.
Feb. 8	2000 gms.	-
Feb. 10	2180 gms.	-
Feb. 14	2100 gms.	-
Feb. 24	2220 gms.	-
Mar. 7	2200 gms.	Examined.

POST MORTEM EXAMINATION.

There was no change in weight. There is no general wasting.

THORAX. Both lungs contain a number of healing and retrogressive tubercles; all the other organs of the body are healthy. A Retrogressive Tubercle.

RESULT. The tests employed show that one is dealing here with a Bacillus of the Human type.

EXPERIMENT NO. 70.

R.E. 5 years.

HISTORY. The patient was admitted to Hospital suffering from a tuberculous ankle. The condition first appeared 5 months ago, and it was supposed to have begun by an accident.

PREVIOUS HISTORY. The child had previously been quite healthy.

FAMILY HISTORY. There is a family history of tuberculous disease.

December 11th. The child was operated upon and the ankle joint scraped. A portion of the diseased membrane was inoculated into a guinea-pig.

PROGRESS OF GUINEA-PIG.

Date.	Weight.	State.
Dec. 11	420 gms.	Inoculated.
Dec. 17	400 gms.	-
Dec. 25	378 gms.	-
Dec. 20	370 gms.	-
Jan. 8	360 gms.	Examined.

POST MORTEM EXAMINATION.

There is disease of the left groin and axillary glands, and both are caseating.

THORAX/

THORAX. There are a number of epithelioid follicles in both lungs.

ABDOMEN. The spleen is tuberculous; also the liver and the retro-peritoneal glands. A chronic tuberculosis.

Cultures were made from all the possible sources.

TESTS. A. APPEARANCE OF ORIGINAL CULTURE.

The original culture grew with considerable freedom - it spread over the surface, at first in a number of isolated foci, and then amalgamating, formed a foliaceous growth.

B. MORPHOLOGICAL CHARACTERS.

The Bacilli are uniformly long; some of them showed nodular staining, more especially in later cultures. They possessed the characters one ascribes to the Human Bacillus.

C. GENERAL CULTURE TEST. Inoculation of Glycerine tubes tended to increase the growth of the Bacillus. Characters of a Human Bacillus.

D. INOCULATION TEST.

Rabbit inoculated with ·01 mgm. of Tubercle Bacilli.

PROGRESS./

PROGRESS OF RABBIT.

Date.	Weight.	State.
Jan. 20	2000 gms.	Inoculated.
Feb. 8	2100 gms.	-
Feb. 28	2110 gms.	Gaining weight.
Mar. 9	2200 gms.	Examination.

POST MORTEM EXAMINATION. There was no evidence of tubercle throughout the body, except a few lung tubercles. A Retrogressive Disease.

RESULTS. The tests employed show that one is dealing with a Bacillus of the Human type.